ELECTRICAL TIMES

THURSDAY
10 SEPT. 1953
NINEPENCE

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4486

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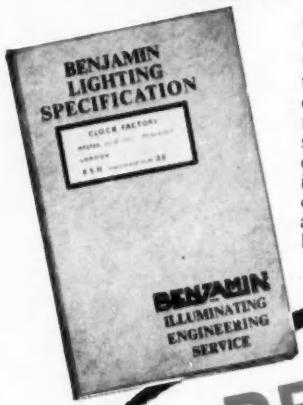

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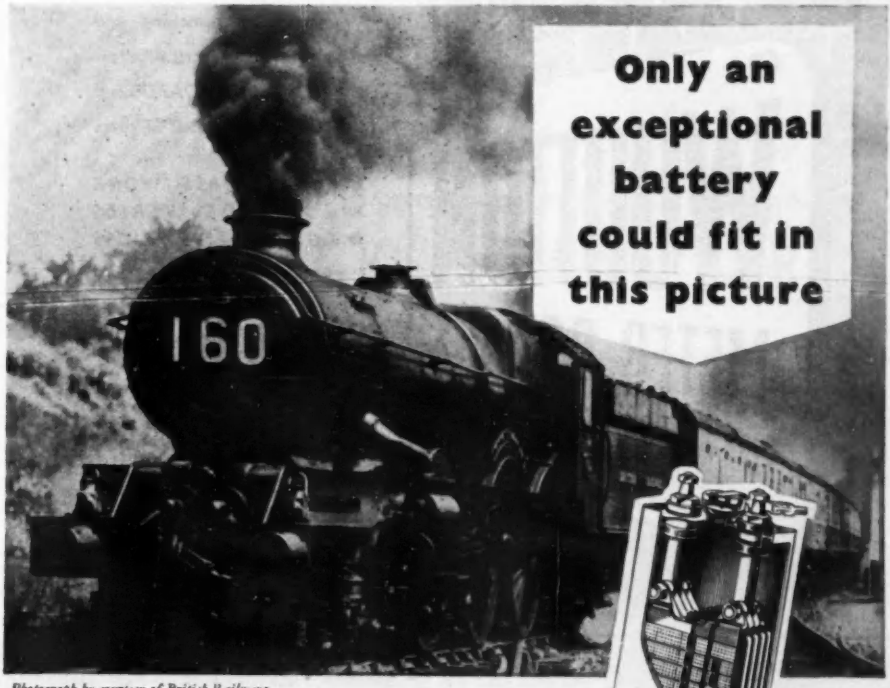


Only an exceptional battery could fit in this picture

Photograph by courtesy of British Railways

When an express train is thundering down the rails, on schedule to the minute, every part of the locomotive is being put to a gruelling test. The batteries which travel on these giants—no less than any other part of the engine — have to be good to take the hours-long pounding every trip entails.

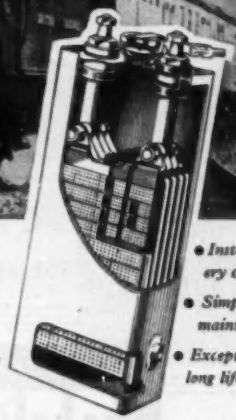
Eighteen years ago, the G.W.R. chose Nife steel batteries to ride on their locomotives, acting as watchdogs of safe rail travel, and British Railways' Western Region have seen no reason to change. Little wonder, since some of the original batteries are still in use after giving 17 and 18 years of trouble-free service! Today 4,500 Nife batteries provide the operative power for the Region's automatic train control system.

Nife Batteries can take it

Except when the brakes are on, Nife batteries are under a small but continuous load and subjected to constant vibration and shock. Nife batteries stand up to rough usage because they're made of steel — case and plates—and have great mechanical strength. They cost little to maintain and give maximum energy in a minimum space.

Exceptional ruggedness and dependability make

- *Costs less to maintain*
- *Immensely strong steel case*
- *Takes up less room*



- *Instant recovery of voltage*
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Nife batteries in demand for all railway needs; signal controls and point machines, communications, lighting and control circuits on electric trains, electric locomotive control batteries, sub-station switchgear control and protection, and platform trucks. In fact, you'll find Nife Batteries doing the toughest jobs, the world over.

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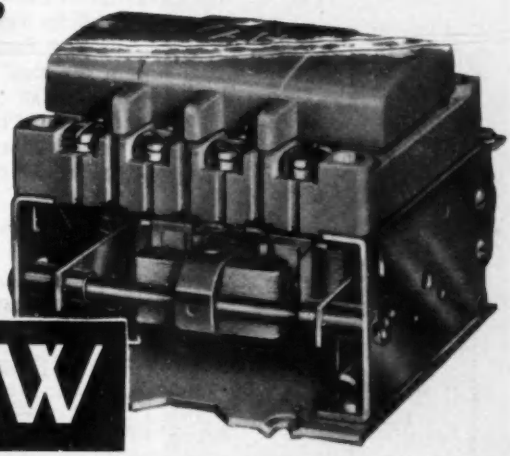
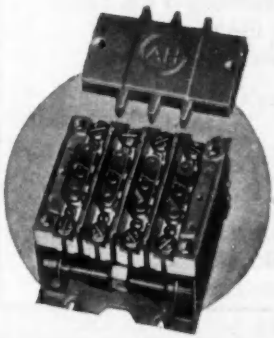


-this design offers you-



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RATING AMPS.	LIST NOS.	ASTA CERTIFICATE NUMBERS		
		B.S.88: 1939	B.S.88: 1947	
		440 AC 4	440 AC 4	440 AC 5
30	T1A30	617	1016	2074
60	T1S60	616	903	2022
100	TC100	615	932	2021
200	TF200	251	933	2033
300	TKF300	252	934	2032
400	TM400	629	935	2031
500	TT500	354	936	2025
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F.7

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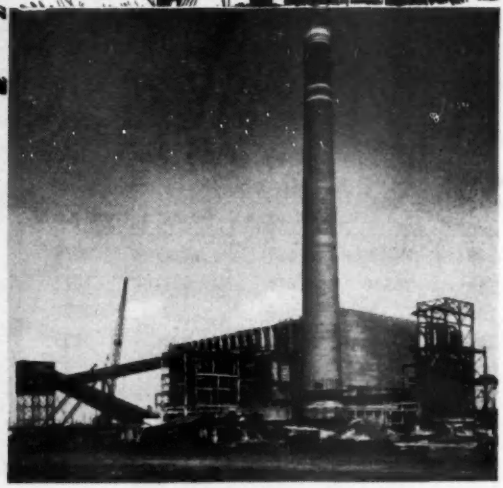

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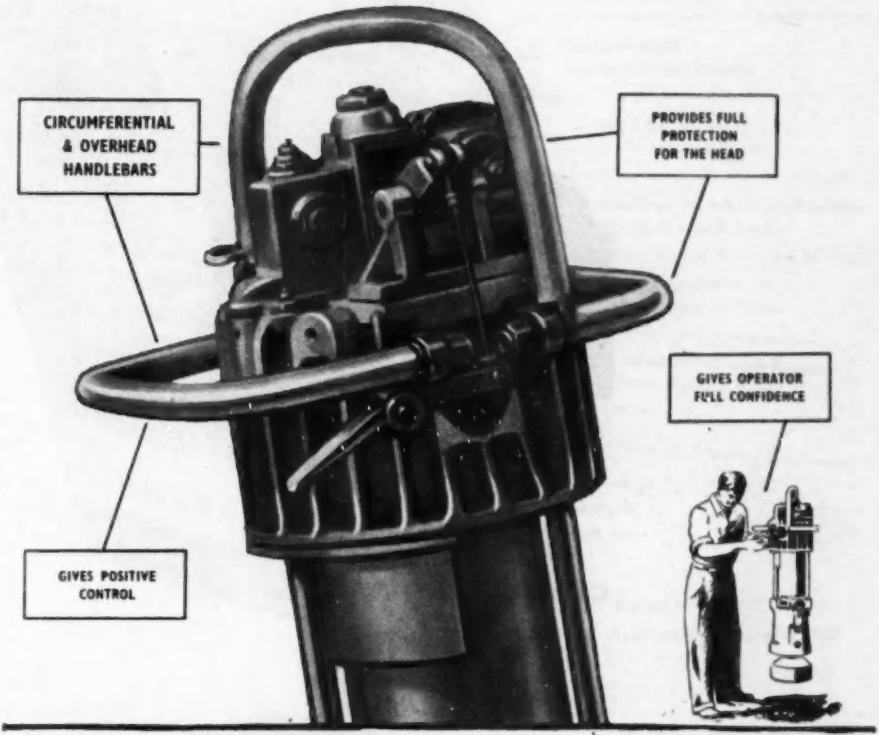
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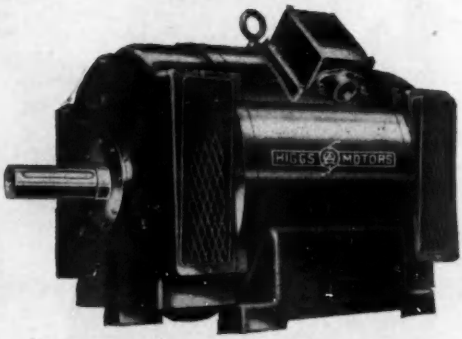

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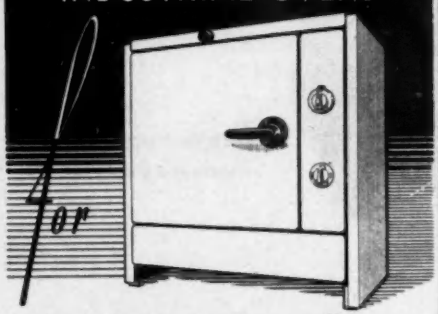

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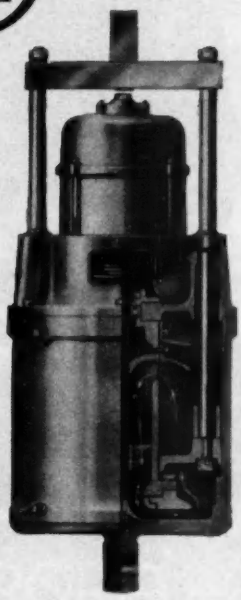

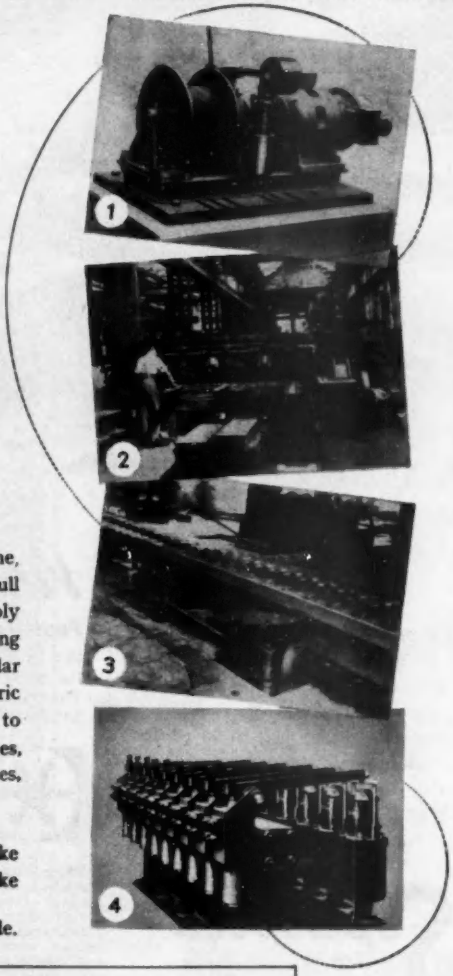

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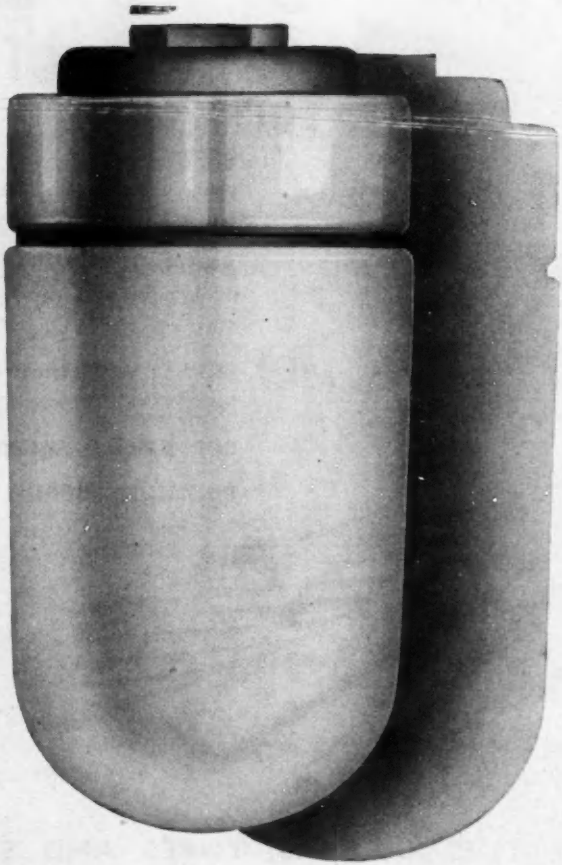

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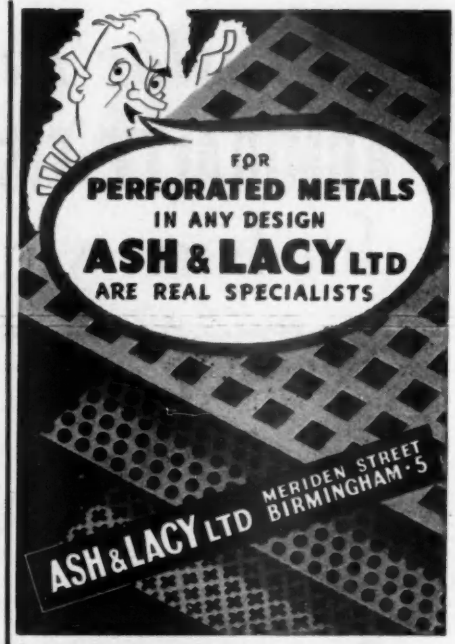

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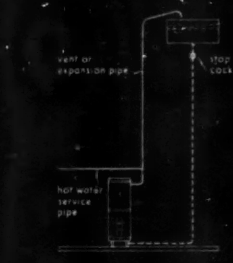
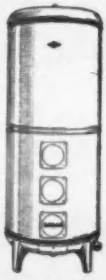


SADIA AUTOMATIC ELECTRIC WATER HEATERS FLOOR MOUNTED PRESSURE TYPE
40 gallons 50 gallons 60 gallons capacities



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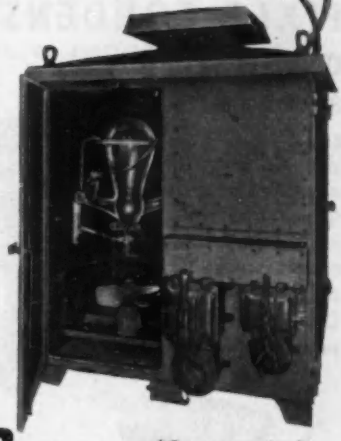

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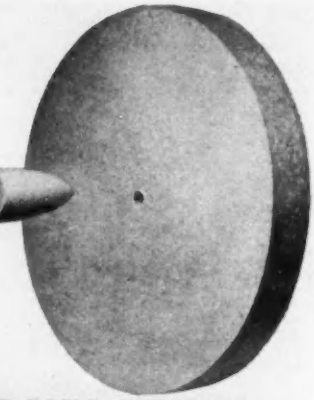

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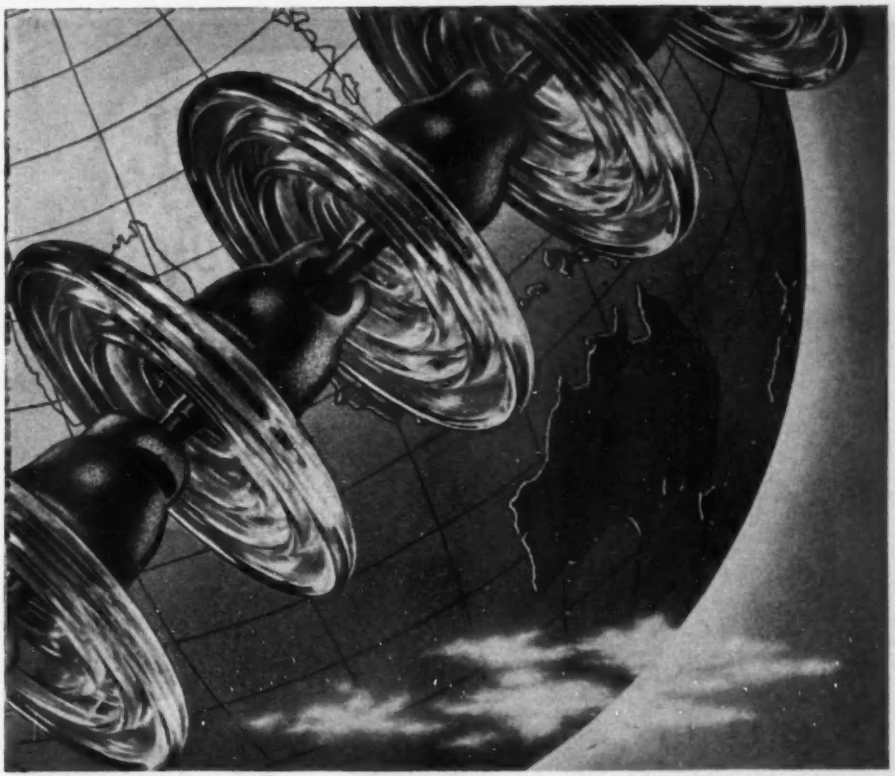

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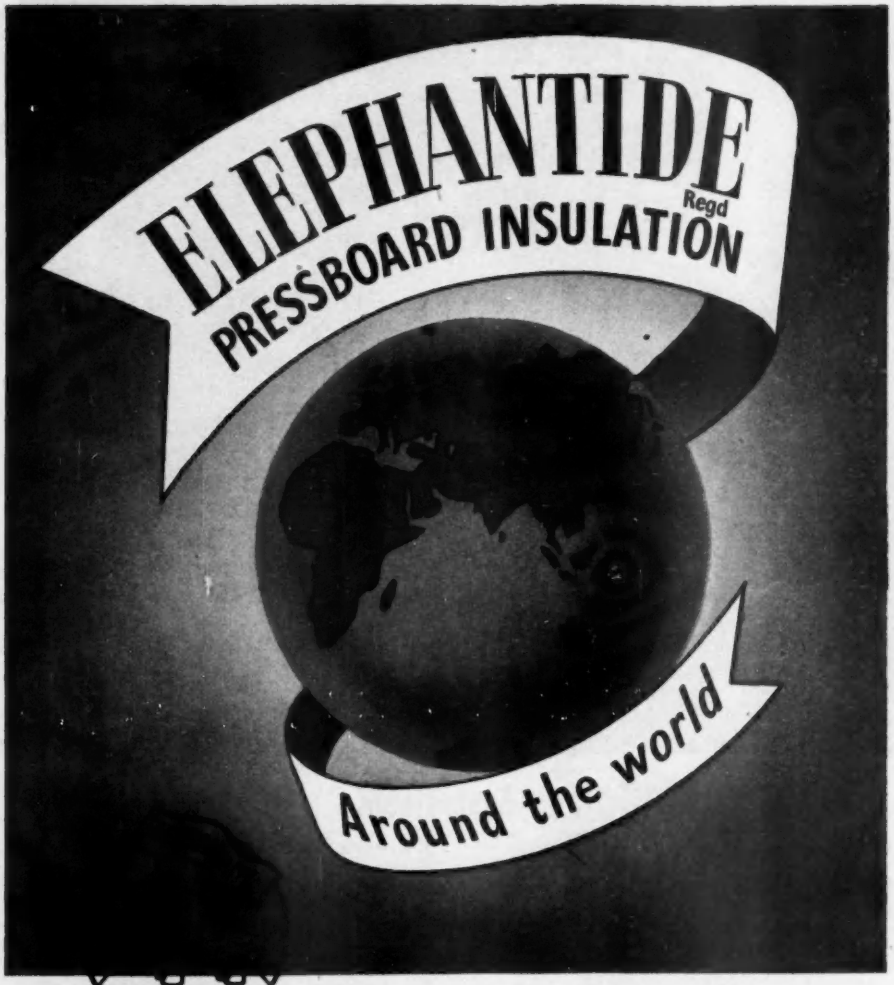

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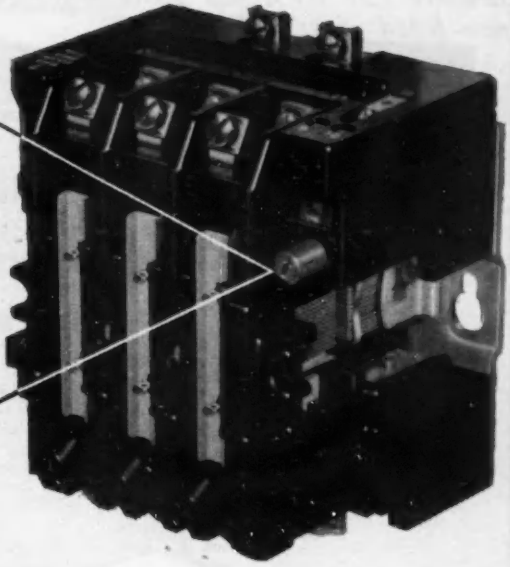

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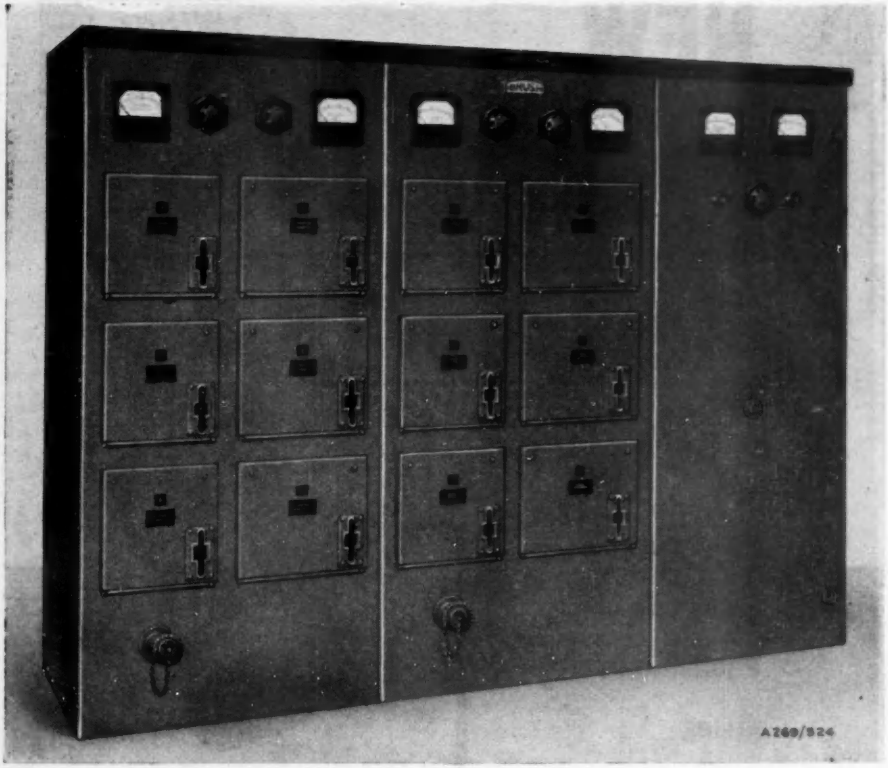

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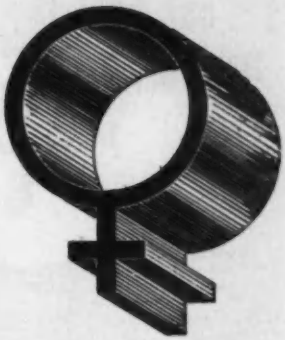

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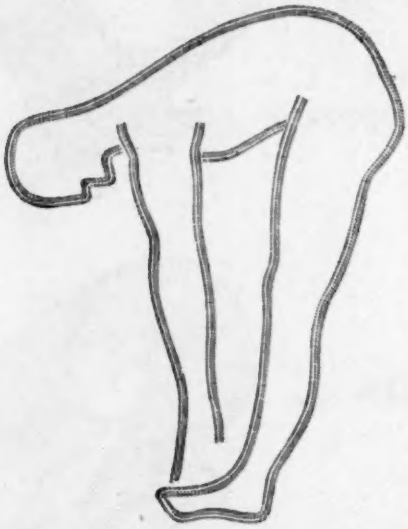

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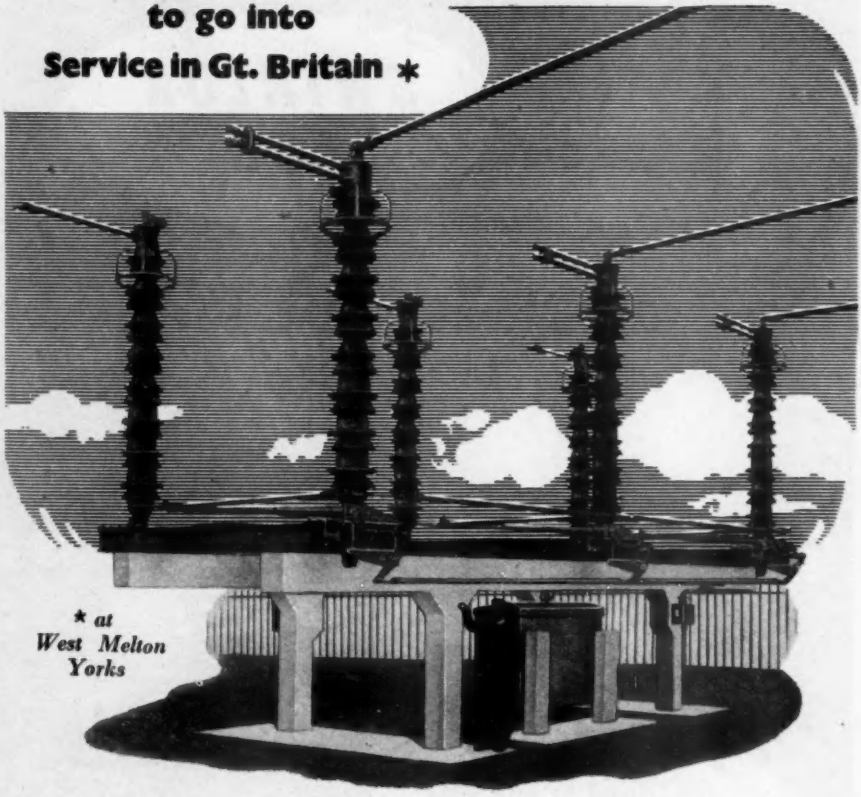

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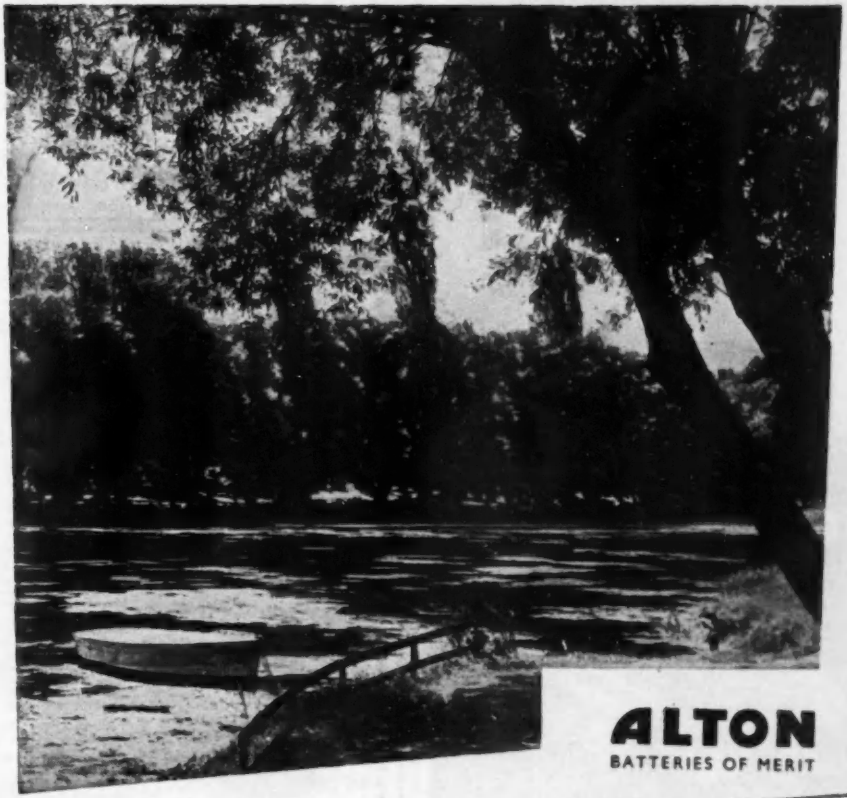

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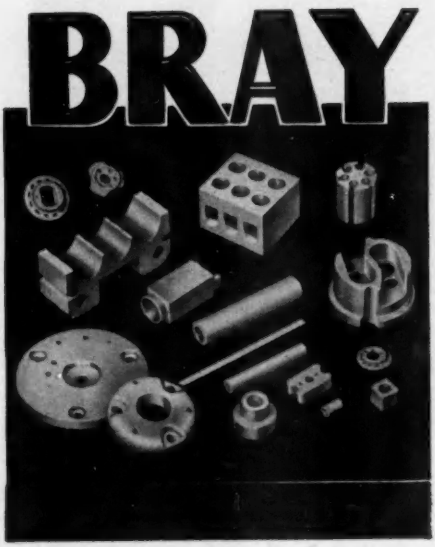

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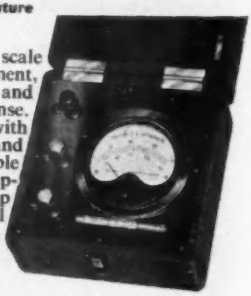

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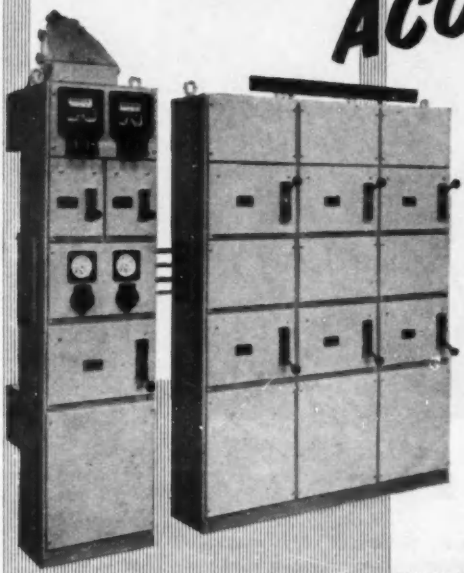

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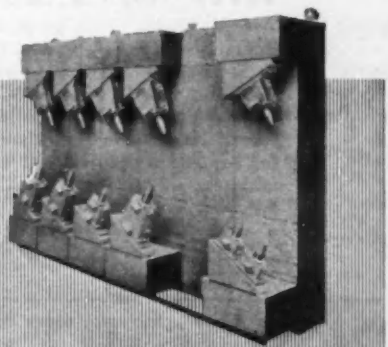

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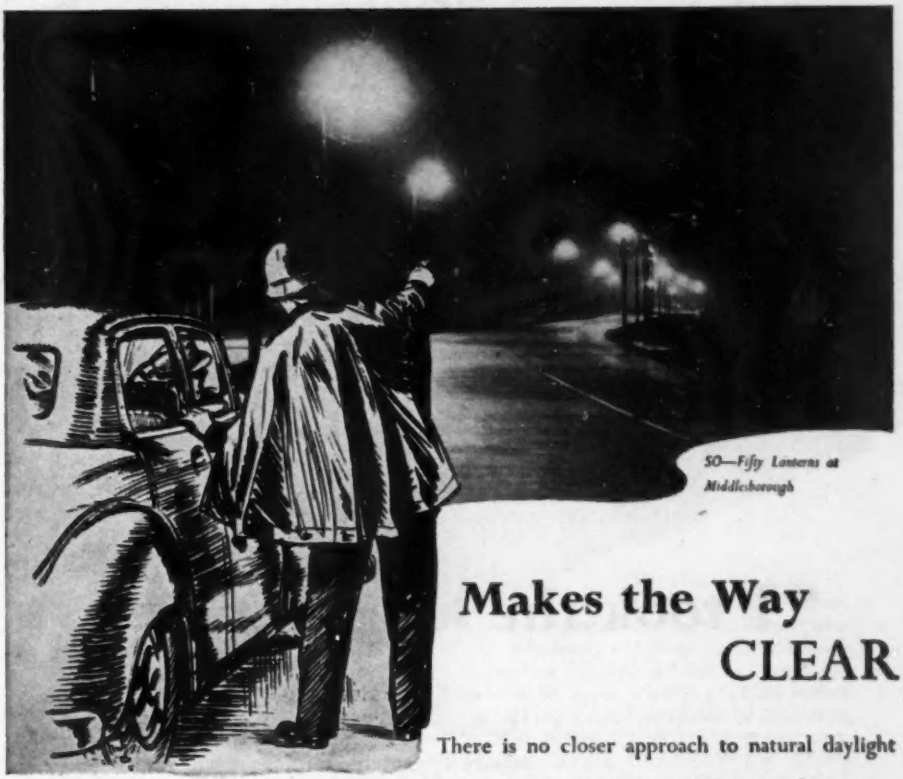

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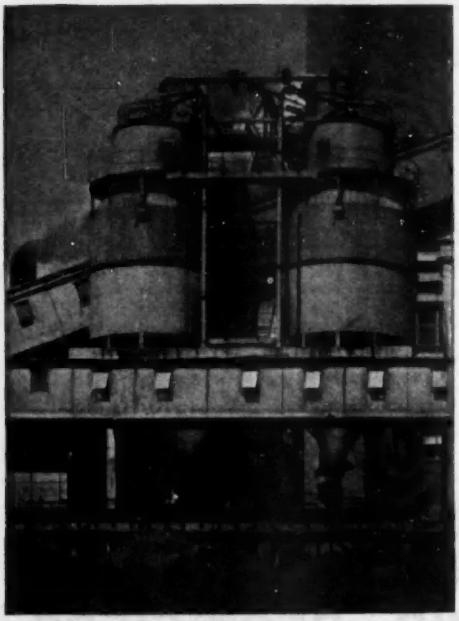

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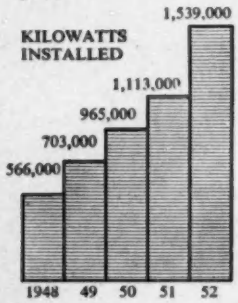
In the five years since the British Electricity Authority came into being, record amounts of new generating plant have been installed each year.



In 1952 there was installed more than twice the pre-war record figure of 759,000 kilowatts.

BRITISH ELECTRICITY

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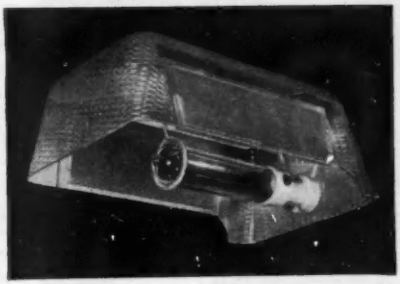
Z 5515/6/7 SB
for OSRAM tungsten and mercury lamps

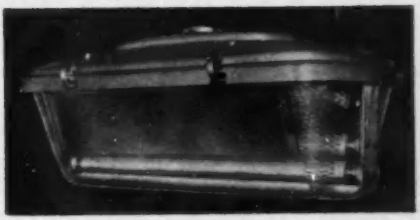


Z 9720 for OSRAM sodium lamps

Z 9456 for OSRAM sodium lamps

Z 5643 for OSRAM tungsten or mercury lamps

Z 8442 "Four-Forty" lantern for OSRAM fluorescent tubes



Z 8247/8 "Two-Forty" lantern for OSRAM fluorescent tubes

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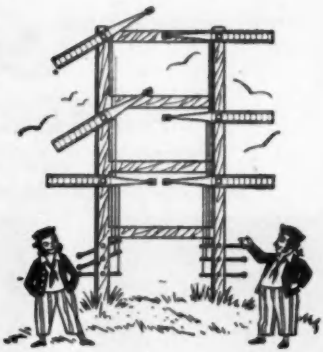

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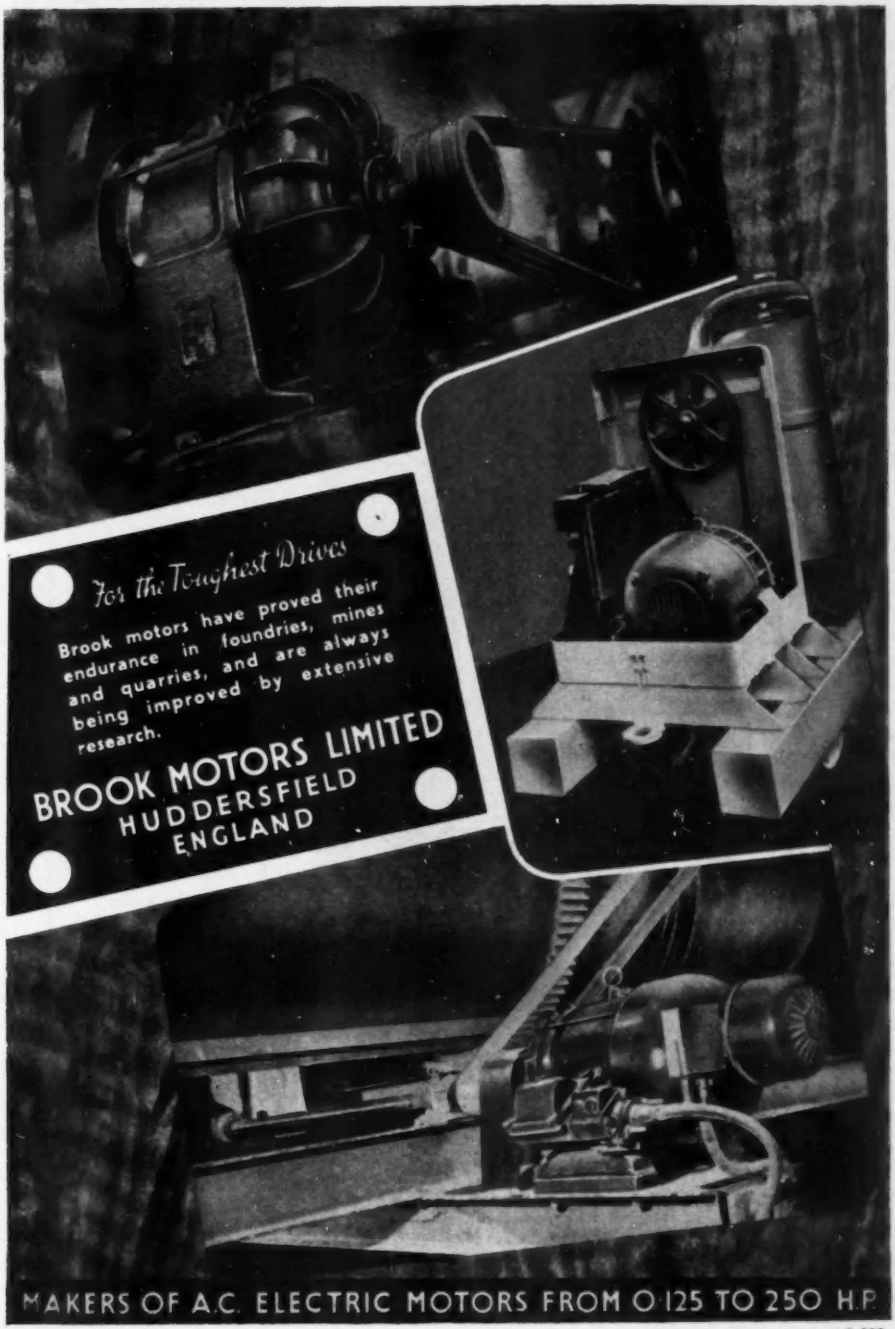
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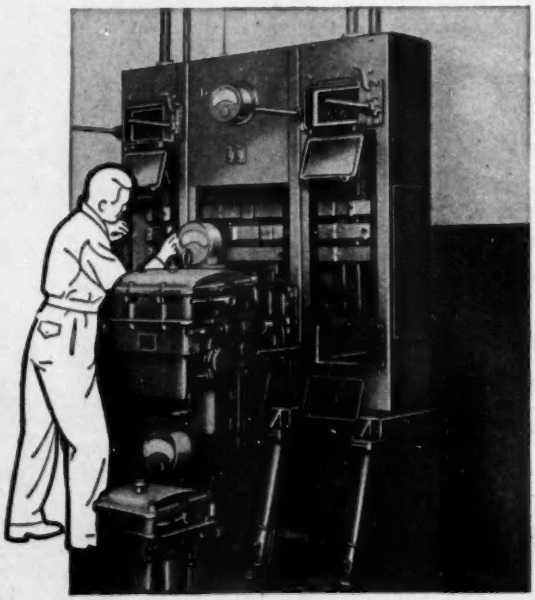

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ELECTRICAL TIMES

Volume 124 No. 3227 10 SEPTEMBER, 1953

PUBLISHED EVERY THURSDAY

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ESTABLISHED 1891

SUBSCRIPTION RATES—United Kingdom and Overseas £2 10s. 0d. per annum. Canada C$7·50c., U.S.A. $7·50c. per annum. Subscriptions are payable in advance and may commence with any issue throughout the year. Overseas subscriptions may be paid to The Electrical Times Limited by banker's draft, cheque or international money order. Single copies are obtainable, price 9d. each.

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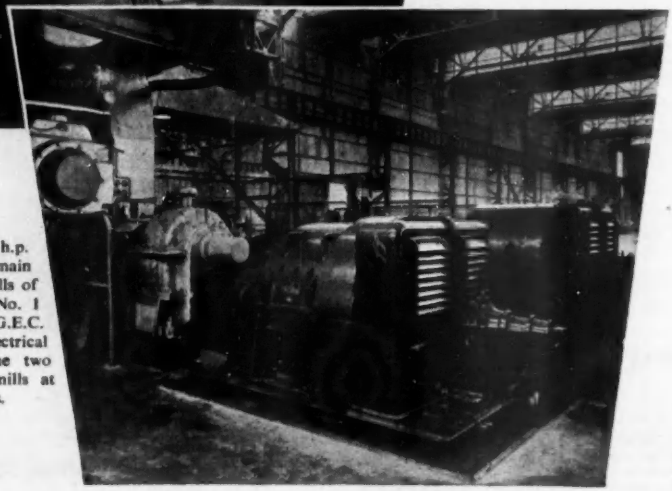

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Editorial

BIASED FUEL SAVING

THOSE who hoped that the Productivity Report on Fuel Conservation might make a substantial contribution to the solution of the problem of our wasting coal reserves will be sadly disappointed. As might have been anticipated, the team found little in America which had any real bearing on the subject—mainly because there is, of course, no fuel conservation problem, as such, in that country. However, having been charged with the task of investigating and recommending measures to reduce the coal consumption of Great Britain, the team has taken the opportunity of expressing its views at considerable length. Many of the 40 recommendations are of doubtful value, and, throughout the Report, it is possible to see a definite anti-electrical bias. Responsibility for this is mainly due to the constitution of the team which was composed largely of men with strong solid fuel and gas affiliations. In the result, electricity is decided upon as the principal villain of the piece. The arguments leading to this deduction are in many cases based on premises which will not bear logical and detailed examination.

OPPORTUNITY ELSEWHERE

THE blunt truth of the matter is that the greatest opportunities for fuel conservation lie in the industrial and domestic fields. Some 50 million tons of coal are used every year for the sole purpose of producing process steam in factories, and according to the team over 15 million tons of this could be saved by more efficient utilisation. This quantity is over four times the amount of coal used by the B.E.A. for the domestic space heating load —and it is on the question of electric space-heating that the team makes its most vicious attack on the electricity industry. While there can be no objection to the principle of looking for savings in every field of consumption, the Report certainly appears to have carried this principle to disproportionate lengths as far as electricity is concerned.

HOSPITAL SAFETY

IN the hospital operating theatre earthing becomes even more clearly a matter of compromise than in other electrical installations. The usual considerations of preventing shock danger are complicated by the equal need to prevent the generation of static electricity, with consequent sparking and the explosion of dangerous anaesthetic vapours. High insulation values reduce shock risk to staff (not necessarily to the patient, though) but they are favourable to the accumulation of electric charges; the use of conductive rubber, on the other hand, while allowing the electrostatic charge to leak away, markedly extends the shock risk. A circumscribed zone of safety remains after compromising on these two considerations, and a correspondent in an article on a later page argues persuasively for extending it by the choice of a low voltage supply for the many electrical appliances now in surgical use. For existing installations this may be a counsel of perfection, but there is much to be said for the extension of a technique which has proved its value in other spheres in recent years. Whatever method is used, however, the need for particularly careful maintenance of electrical apparatus used in operating theatres will remain, and it must be backed up by the regular and methodical testing repeatedly urged by the responsible authorities.

FASTER DESIGN

THE early wonder engendered by the speed of computation of electronic calculating machines is gradually giving way to the

inevitable blasé acceptance of an accomplished fact. In its place there is amongst engineers a growing interest in the application of these machines to design and development. Much of the early work for which they were used concerned the computation of tables or the solution of problems in ballistics, but their versatility extends far beyond such confines. At Liverpool during last week's British Association meeting both mathematicians and technologists gave papers on aspects of electric computors and computing, and there was an interesting underlying unity of approach. The engineer saw the advantage that the machine offers, of accepting data in a raw state and delivering an answer, if convenient, in the form of final drawing-board dimensions. The troublesome intermediate stages of arranging the data in the form of regular equation patterns can be omitted, and the engineer can obtain design values for a whole range of initial conditions with no need for advanced mathematical knowledge. In the general case, noted by the mathematician, the dangers of over-simplification can be avoided. The need to make numerous assumptions to obtain a mathematically manageable statement of a problem is dispelled. In both cases confidence in final results is thus increased.

ISOLATED SUPPLIES

ALTHOUGH the trend today is firmly towards ever larger generation units, there is a complementary increase in the attention given to the requirements of small isolated communities. The special difficulty that has to be overcome is the absence of any of the usual fuels, and of the means whereby they might be fetched. Recently the National Research Development Corporation became interested in the problem, considering the design of a light steam engine, which could burn locally available wood fuel. Now another possibility is put forward, this time in a British Association paper on solar energy as a power source. The author, Dr. H. Heywood, takes a more optimistic view of the future of solar energy as a power source than some other experts, and, while warning that there is little likelihood of its application in large communities, has hopes for success in the special case of isolated groups in tropical countries. Here small steam units might again provide the link between available energy sources and required power. Rated as between 5 and 10 kW, they could use steam raised by the absorbed heat of the sun. Since experiments have shown the practicability of such schemes, cost is now the determining factor, and in present fuel conditions solar energy utilisation appears to be standing at the boundary of economic feasibility. Future research may well enable that divide to be crossed.

OVERLORDS AND EXPORTS

GOVERNMENT reconstructions are seldom of moment for electrical men in their work-a-day capacity, but that announced by Sir Winston Churchill last week was doubly an exception. First, it brought about the end of what has commonly been spoken of as the "overlord" system, by which the Minister of Fuel and Power (amongst others) was specifically subject to the co-ordinating authority of another Minister of senior rank. There will be no regrets that Mr. Geoffrey Lloyd will now be able to exercise his many statutory duties in respect of the electrical industry with comparative freedom from the delaying need for reference upwards. This change, however, affects mainly the supply industry and its associates. Electrical manufacturers are more concerned in the one new ministerial post introduced by this cabinet reshuffle. The appointment of a Secretary of State to have special responsibility for overseas trade must be of immediate interest to this industry, which has established so many new export records in the past few years. It is a sign of the prime importance still attached to business from overseas, and it should act as encouragement for still greater effort, quite apart from the increased practical official assistance to which it is to be hoped the new appointment will lead.

Meteor

10 SEPTEMBER, 1953

Electricity in Operating Theatres

INCENDIVE SPARK AND SHOCK HAZARDS MUST BE COMBATED

By B. G. PALMER

WHEN an explosion of anaesthetic gases occurs in an operating theatre, the cause is always very difficult to ascertain. Nevertheless, it is a subject which should receive the earnest attention of all concerned. The magnitude of the explosion may be such that it is accompanied by loss of life, or serious injury, or damage to apparatus; or it may be so slight that it merely evokes an exclamation of surprise. If the hospital engineer, all theatre personnel including the surgeon, the anaesthetist and the theatre sister and her staff are all aware of the danger, and have an understanding of its nature, a great stride will have been made towards eliminating the danger.

It is known that the explosion is caused by the accidental ignition of the anaesthetic gases by a spark from some piece of electrical apparatus, or by a spark resulting from a static charge of electricity. It is with the cause and prevention of these sparks from static and dynamic electricity that this article is concerned. One knows, or can find out roughly, how many lives have been lost by these accidents, but it is impossible to find out how many lives have been saved by taking all precautions.

Anaesthetics

It is inhalation agents used in anaesthesia that are concerned and not the local, spinal or intravenous injections; although in passing, it might be mentioned that the cleaning of the skin with spirit is potentially dangerous. In general, safe agents are not good anaesthetics; consequently there is a tendency to use inflammable agents for anaesthesia, in spite of the risk involved.

Now examine the methods of using these agents. There is the ordinary anaesthetic machine in which the agents are mixed and passed on to the patient who rebreathes part of the mixture, the other part being expelled to atmosphere through the expiratory valve. Bearing in mind the subject of this article, this type of machine is undesirable, as dangerous mixtures are being expelled all the time. Because of this feature in the ordinary anaesthetic machine the modern "closed circuit" type of machine has been evolved. In this machine the agents are mixed as before and fed to the closed circuit through 3 or 4 ft of rubber tubing. The carbon dioxide absorber is included in the circuit, and in theory, there should be no leaks. One possible weakness in this type of machine is that, should the closed circuit receive too much mixture, the increased pressure in the circuit opens the automatic compensator valve and excess gas is expelled to atmosphere.

Both types of machine are liable to certain troubles such as punctures in the rebreathing bag, or in any part of the system of rubber tubing. Leaks may occur through damaged slip joints. The face mask is another point where leaks may occur. Static electricity may be generated by friction in rubber tubes through which dry gas is passing. Tubes containing gas moistened by the patient's breathing are free from this trouble.

The third method is the open mask. This consists of a pad of gauze and cotton wool with a hole in the centre which is placed over the patient's face. A small frame (Schimmelbusch's Inhaler) covered with another absorbent pad, is placed over the patient's mouth

and nose, and ether dripped upon it from a bottle. More ether is used by this method and it all escapes to atmosphere. In the "closed circuit" anaesthetic machine about 6 litres of gas are being pushed around the circuit; and much of the energy of the patient is used in breathing against disc valves, and overcoming friction of gases in the tubes and soda-lime absorber. Because of this the open mask is often used in connection with old people and patients with enfeebled breathing. The method is also used for young children because of their feeble respiration.

Ignition of Anaesthetics

From the foregoing it is apparent that a highly inflammable or explosive atmosphere sometimes exists in the vicinity of the operating table, and ensuing remarks are chiefly concerned with this area in the operating theatre. Boyle and Llewellyn[1] in 1947 established the fact that a spark energy of 0·00045 joules was sufficient to ignite a mixture of ether and air. It has since been established[2] that a spark energy of 0·001 milli-joule is sufficient to ignite certain concentrations of anaesthetic mixtures.

In connection with the generation of static electricity in operating theatres, D. Bulgin conducted some interesting experiments[3] in 1949 in which he demonstrated that a potential of 10,000 volts could be generated by drawing a blanket across a rubber pad lying on a stretcher trolley. The capacity of such a trolley has been established as about 0·0003 micro-farads. Substituting these values in the equation $E=\frac{1}{2}CV^2$ (where E=energy in joules, C=capacity in farads, and V=voltage of the charge) we have $\frac{1}{2}\times 3\times 10^{-10}\times 10{,}000^2=\cdot 015$ joules. So, when an earthed object is brought into close proximity to a charged trolley, the spark energy may be anything up to 0·015 joules, which is many times more than necessary to ignite certain anaesthetic mixtures. It may be inferred from these figures that articles many times smaller than stretcher trolleys are a potential danger.

The generation of static can occur in operating theatres through the friction of clothing, blankets, etc., or indeed of any insulating material with the dry surfaces of rubber articles. This friction can occur at a number of points, such as between a rubber mattress and a blanket drawn over it, between clothing and theatre furniture, between castor wheels and the floor, and between boot and shoe soles and the floor. In all these instances the rubber imparts an induced charge to the metal object (or semi-conducting body in the case of boots and shoes) with which it is in contact. Rubber acquires a negative charge by friction and blankets and clothing acquire a positive charge.

Suppression of Static

The best method of suppressing static electricity is to ensure that there is a conducting path to earth from all possible points of generation; also, that all articles liable to acquire an induced charge are connected to earth. The resistance of the path to earth need not be very low. It can be shown from Siemen's formula for measuring high insulation, that a trolley of capacity 0.0003 microfarad, and resistance to earth of 100 megohms, and a charge of 10,000 volts, will lose 95% of its charge in 1/10 second. A transposition of the formula is as follows :

$$T=\frac{RC(\log V-\log Vt)}{0\cdot 4343}$$

where T=time, R=resistance to earth (100 megs), V=initial voltage of the charge (10,000 volts), C=capacity of the trolley (0·0003 micro-farad), and Vt=voltage after time T (0·05 V). Calculated for these values T=1/10 second approximately.

Since ordinary rubber is the chief cause of static generation, substitution of all rubber articles by others made with semi-conductive rubber is a prerequisite of safety. Also, the theatre floor must be of a semi-conductive nature and connected to earth. But the change-over to conductive rubber must be complete as the following points will show.

(1) Reverting to the action of drawing a blanket across a rubber pad on a trolley; substitution of a conductive rubber pad for the ordinary rubber pad will not prevent static electricity being generated. The charge generated is almost as much as with ordinary rubber, and the whole of the charge is immediately transferred to the metal trolley by conduction and induction. The trolley must therefore be fitted with conductive rubber tyres also, in order to conduct the charge away to earth. It is for this reason that the author prefers to call the new material "conductive" or "semi-conductive" rather than anti-static.

(2) It should be noted that an article connected to earth through 100 megohms does not ensure a safe discharge from a charged body coming into close proximity. The charge is only dissipated safely in the article which *receives* the charge, provided its resistance to earth does not exceed about 100 megohms.

(3) Experiments[4] have shown that if a

charged body comes close to an article connected to earth through a relatively low resistance (50,000 ohms to 300,000 ohms) the incendivity of the resulting spark may be higher than would be the case if the article was at zero resistance to earth.

(4) A charged mass is surrounded by an electric field and any metal or semi-conductive article coming within its influence will acquire a charge if it is insulated from earth.

If the change-over to semi-conductive rubber is complete, then all these points are effectively catered for.

Mains Risks

Notwithstanding the fact that mains electricity shock hazards are covered by the I.E.E. regulations, it seems to be the trend at the moment to try and supplement these by stipulating a resistance to earth of all theatre personnel and apparatus of not less than 100,000 ohms. The author considers this trend ill advised. In the first place, how was the figure of 100,000 ohms arrived at? A spark just visible in half daylight occurs when making and breaking a 230 V 100,000 ohm circuit. This is almost sure to be incendive. Also, from Ohm's Law, a person in contact with a "live" appliance will pass about 2·3mA from 230 volt mains. Tests reveal that 2·3mA can easily be felt. Sensation of shock increases rapidly until at 4 mA it becomes unbearable. It has been suggested that 8 mA can be fatal. The gap between 2·3 mA and 8 mA is not large enough, and 100,000 ohms seems by no means high enough to afford protection in the event of faulty electrical apparatus being handled. A higher minimum resistance would not be the answer to the problem because of unpredictable conditions which occur in operating theatres.

Rubber Resistance

For instance, in a recent test of the resistance of a pair of conductive rubber boots, a value of 800,000 ohms was found when they were first put on, standing on a dry terrazo floor. After three hours' wear they were tested on a wet floor when the resistance was found to be 50,000 ohms. There may be thousands of these boots in use now, and the life of these will probably be many years; also, possibly, when the soles are worn smooth, the resistance to earth may be lowered. Manufacturers are now making a special boot with an insole so fitted that the resistance of the complete boot is unaffected by external moisture, but this does not solve the problem of the boots already in use.

Consider what could happen while the resistance of the boots remains high. A person would be in ignorance of any "live" appliance he might be holding and inadvertently allow it to touch the earthed frame of a larger piece of apparatus, in which case there would be a severe dynamic spark. He might even lay it on the metal top of the diathermy machine or similar piece of apparatus. Another dangerous situation could arise under certain circumstances, such as the following, in which the shock hazard is present. A surgeon might pick up a "live" appliance (or he might have it handed to him, but it is all the same, as nobody will know that it is alive) and apply it to the patient who, by virtue of his large area of contact with the table through the conductive rubber pad, might be at a much lower resistance to earth, and consequently liable to receive a severe shock. Other things which could contribute to the patient's low resistance to earth are parallel paths, such as the connecting tube to the anaesthetic machine; also, the anaesthetist might be touching the patient's face for one reason or another; or the indifferent diathermy electrode might still be connected, and this might be fully earthed. As far as boots are concerned, high resistance means that the patient might be in danger from severe shock, and low resistance, that the theatre staff might receive shocks.

Consider a four-wheel trolley. Writers on this subject often suggest that, for anti-static purposes, two conductive rubber castors are satisfactory, but at the same time they recommend that four be fitted. B.S. 1938 : 1953 stipulates 100,000 ohms for each castor. If four castors are fitted the resistance of the trolley to earth is only 25,000 ohms. Should a "live" appliance be laid on it the whole trolley will become "alive," and at the same time a current of several milliamps would be flowing to earth via the conductive rubber castors. Obviously these remarks apply only to all-metal trolleys with fixed shelves.

Insulation and Isolation

A lower insulation limit (not necessarily 100,000 ohms), to be thorough, should be applied to everything in the same room. But this is impossible because of hot water radiators, sinks, taps, sterilisers, steam sucker, etc., which are ranged around the wall of a great many theatres.

If the problem is to increase the safety of small portable appliances, it may be regarded in this way. The danger comes up to the supply point via one small wire and the

earth, namely, the live wire of the public supply, and the neutral by reason of its being earthed at the substation. The neutral of a large network must be earthed, but for a single portable appliance the author suggests that consideration be given to the use of a double-wound transformer for supplying an earth-and-mains-free socket-outlet. This will effectively isolate the live and neutral mains. Theorists will at once say that, owing to the capacitance coupling effect, the supply is, in truth, not earth-free. But the power available between the secondary and earth is very small and certainly less dangerous than direct connection to the live main. In any case the difficulty can be overcome by a specially constructed transformer. If the primary and secondary are mounted on separate limbs and covered with earthed metal shrouds, the possibility of breakdown between primary and secondary would be virtually eliminated and the capacitance coupling effect effectually suppressed. After all, earth-free secondary circuits are connected daily to patients in the Physiotherapy Department and it is taken for granted that this practice is safe.

Maintenance Problems

Exponents of the live and earthed supply system with its 3-core leads, plugs and sockets, say that it is up to maintenance engineers to see that routine inspection and testing is up to scratch and carried out by competent men, etc. But all this relies a great deal upon the human element. Certainly there must be reliable maintenance but there is no really reliable test of a flexible earth-wire. There is a 3-core flex made with the earth wire stronger than the other two, but this does not eliminate the danger of inexperienced tampering with the plugs. Moreover, the spark risk is still present.

So far as static electricity is concerned, it can be effectively suppressed by the complete adoption of semi-conductive rubber to earth all objects not already earthed. With everything earthed it should not be possible for the static field surrounding a charged blanket to induce a charge into any metal object. To still further lessen the risk blankets should be stored in an atmosphere of approximately 65% relative humidity. For the suppression of static reliance may be placed on conductive rubber. Electronic ionisation and warning devices will bring all sorts of complications in their wake, such as increased maintenance, and increased reliability on the human element on the part of the theatre as well as the usual maintenance staff.

Similar comments could be made about air conditioning plant. This needs expert and careful attention and is very expensive. All these devices cannot be relied upon without the aid of conductive rubber to keep everything at earth potential. For reliability we must have simplicity, and it seems to the author that conductive rubber gives this.

Earthed v. Earth-free Supply

All the advantages and disadvantages, and all the strong points and weaknesses which are common to both systems can be eliminated from the argument. Then, when the uncommon points, both good and bad, are considered, it seems to the author that the advantage lies with the earth-free supply method. Low voltage earthed supply means that the severity of the accident is reduced, but not the frequency. With earth-free supply, accident frequency is reduced also. For these reasons consideration should be given to the use of low-voltage earth-free supply points for all apparatus liable to come into contact with the patient. This method of insulating the mains voltage from the patient is more reliable than setting a lower limit of conductive rubber resistance, because of the amount of fully earthed material which is already present in operating theatres. Parallel paths of conductive rubber will also nullify the effect of any lower limit set. Each theatre should be fitted with one low voltage earth-free socket-outlet for the use of any appliance likely to come into actual contact with the patient. This socket-outlet would be complete with its own specially-constructed transformer.

Testing for Economy

An instrument the author would like for the maintenance staff is an insulation-testing ohmmeter reading up to 150 megohms. This would prevent over-zealous electricians scrapping conductive rubber before the end of its useful life. Finally, above all other considerations, in trying to minimise the risks present in an operating theatre we should give attention to probabilities and the human element as much as to technicalities.

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(1) "The electrostatic ignitibility of various solvent vapour-air mixtures." from the "Journal of the Society of Chemical Industry."
(2) U.S. Bureau of Mines Report.
(3) "The use of conducting rubber to eliminate electrostatic hazards in operating theatres," by D. Bulgin, F. J. Llewellyn and Garfield Thomas. 1949.
(4) The ignition of explosives by condenser discharges —effect of added circuit resistance. By G. Morris, Ph.D., I.C.I. Ltd.

Our readers' views . . .

New Cable Standards

I AGREE with much of Mr. Wray's letter (published in your issue of 20th August last), but to be fair, the Cable Makers' War Emergency Technical Committee did a good job of work by saving rubber and other scarce materials and yet kept the forces supplied with serviceable cable during the War.

The true reason why plastic cables have not been advocated by many cable makers is due to the fact that many are not equipped to make them efficiently. During the War in order to assist the war effort, many makers tried producing p.v.c. cables on machines which were only suitable for rubber, with unfortunate results. As the largest producers of p.v.c. cables, with experience dating back years before the War, we realise the difficulty of being pioneers. First of all we were told in 1939 that the Ministry could not risk using a "new" material. When, however, America adopted it, then we received orders to produce 1,750 miles per week. Today many firms are installing suitable American type machines, and when this is done many firms will be able to revise their ideas and policy. They will not insist upon "extra" safety margins so as to add cost to what has been a rival product.

By all means let us have B.S.I. specifications brought up to date on technical grounds. Whatever competition there may be between sections of the cable trade, let us rely upon efficiency instead of "wire pulling" to influence specifications, which, when issued, should be strictly adhered to by all manufacturers.

I am told that 83% of the cables made in the United States are p.v.c. and America boasts that England is using types of plant which they scrapped 40 years ago. So those of us who adopted U.S.A. methods 20 years ago have no need to be ashamed of our leadership.

D. A. V. Rist
Managing Director
Rist's Wires and Cables

• • •

Trials and Tribulations

THE contribution to Problems and Practice (August 6th) by J.A.W. under the above heading was interesting and factual and the views of Mr. Mansfield, expressed so carpingly, surprising and unjustified.

I am sure the man with the spanner was not treated too harshly when put off the job, but probably given other work where his strength and enthusiasm could be more usefully employed. Later as a reward for good work he may no doubt be put again to lighter and more important jobs, and thus become a better man for the experience.

With regard to the last paragraph of J.A.W.'s notes, I am sure with his knowledge of electrical and mechanical repair shop work, and the evidence in the broken shaft before him, he has a sound theory for the cause, but simply posed the problem as fitting for "Problems and Practice." The junior draughtsman apprentice, mentioned by Mr. Mansfield, may of course send in a solution to the query, which to me appears the main object of this feature.

T. H. Snelson
BRIGHTON 6

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Dual Purpose Utensils

WITH reference to the article "Dual Purpose Cooking Utensils" by Mr. D. N. Veitch in your issue of 20th August, I should like to point out that there is a simpler solution to the problem of the different requirements in respect of type of utensil of the solid and radiant plates in a "mixed" cooker, and that is to produce radiant plates with a perfectly flat upper surface. If this were done the ordinary flat-base utensil could be recommended as the best type for both forms of plate, while the valuable property of the radiant plate in respect of giving satisfactory results with an ordinary pan would, of course, be unimpaired.

Two years ago I solved the problem when replacing the 8 in. and 6¼ in. solid plates in my cooker by first selecting plates with as nearly flat top surfaces as possible and then skimming a small amount of metal off the top to make them really flat. This operation must be done with care as if it is carried too far the plate will be destroyed. When the plate has been sufficiently flattened to give satisfactory contact with a flat-base pan it will be found that after a long run on full

heat the greater part of the element will not be visibly hot and the efficiency for short or long operations is higher than with any other combination of plate and utensil. Moreover, the results are practically unaffected by the condition of the reflector and the element life must be prolonged by the lower operating temperature.

If anyone wishes to try the experiment I would recommend the single-element plate which I have found usually to be more nearly flat initially than the two-element type. Incidentally, why do so many cooker manufacturers fit two-element radiant plates in conjunction with control devices for which the single-element type is suitable, when the latter are cheaper, have somewhat higher loadings and give boiling times quicker by about a minute for quantities of 2 to 3 pints?

"Contact"

NORTHUMBERLAND

F.H.P. Motor Production in U.S.

AMERICAN practice in the manufacture of f.h.p. motors is reviewed in some detail in the latest "case study data on productivity and factory performance" issued by the Mutual Security Agency. (Distributed in Great Britain by the British Institute of Management, 8, Hill Street, London, W.1. Price 10s.) Six selected firms are taken, and their 1951 production methods and results are presented in considerable detail. The overall results are given in the table below.

All the works except F manufacture sub-assemblies by line methods, and these parts are generally stored to be requisitioned as needed for final assembly. Exceptions are A and B, where some sub-assembly lines can feed directly into final assembly.

Typical Works

As an example of American practice in a medium sized concern, works B may be considered. This has a one storey building, and its equipment is notable for its use of high speed equipment and conveyors for materials handling. Output is about 300 motors per day, and it is the established practice to produce a full month's supply of a particular motor in a four or five day production run, a switch then being made to some other product.

Five engineers are employed for design and redesign of the motors and for time study, and they are considered to be effective in reducing costs. There are constant minor changes in design. All direct workers are paid incentive wages; new workers are given on-the-job training under a foreman's supervision. About 40% of the full factory force are "indirect workers."

Shaded Pole Motor

The product analysed in this case is a 1/100 h.p. 4-pole 110-120 V, 60 c/s shaded pole i.m. Sheet steel is sheared, blanked, drawn and perforated in a series of heavy duty presses to make the housing, and the housing edges chamfered in a lathe. Brackets are sheared, stamped to shape, and spot welded, and the housing is then sprayed.

Laminations for stator and rotor are stamped simultaneously, and both cores are riveted, the copper rivets of the rotor core serving as the squirrel cage winding. Stator coils are wound by hand before being pressed into the slots. The stator is then varnish dipped and baked. The rotor is balanced after the assembly of the core to the shaft. Sub-assembly of rotor and stator and final assembly into the housing are carried out on conveyors.

MAN-HOURS PER MOTOR FOR SIX AMERICAN FACTORIES

Works	Man-hours per Motor			Type of Motor	Horsepower	Total Employees[1]	Number of motors produced per 5-day week
	Direct	Indirect	Total				
A[2]	1·528	0·773	0·755	Induction	1/4	1,500+	7,500
B[2]	0·626	0·382	0·244	Induction	1/100	150	1,500
C[3]	2·098	1·449	0·649	Induction	1/8	250	1,300
D[4]	1·100	0·529	0·571	Brush	1/15	750	2,500
E[3]	1·080	0·670	0·410	Brush	1/15	50	750
F[5]	0·255	0·213	0·042	Brush	1/20	25	1,500

1. Includes motor department and all other factory workers. 2. Highly integrated—fabricates most components. 3. Purchases part-finished housings, pre-stamped laminations and thermal cut-out switches where needed. 4. Purchases pre-formed housings. 5. Purchases stators and rotors complete, and houses pre-formed: primarily an assembler of parts

Conservation of Fuel

Dual-Purpose Stations Recommended in Productivity Report

THE latest report issued by the Anglo-American Committee on Productivity is a remarkable document in many ways. The team which visited the United States consisted of members drawn from the solid fuel, brewing, chemical, textile, boilermaking and heating and ventilating industries, and in their terms of reference were excluded from investigating the prime fuel users. They were, however, permitted to make recommendations dealing with the question of fuel saving in this country.

Recommendations

There are forty recommendations in all, of which the more important affecting the electrical industry are, that: The Government should set up a commission to formulate a national policy; and/or the nationalised industries, coal, gas, and electricity, should be co-ordinated under a Fuel and Power Board. The production of steam in individual works and factories should be abandoned wherever possible in favour of joint services supplying steam and power from back-pressure central stations, i.e., dual-purpose generating stations located in industrial areas. A dual-purpose central station supplying and selling both heat and power should be put in hand forthwith by the B.E.A. in a suitable centre of industry to establish the potential value of the system to the nation, and where this is not practicable groups of industries closely situated should be encouraged to install jointly-owned central heat and power plants. Individual firms should be encouraged to exchange heat and/or power with neighbouring factories. Where conditions are suitable and advantageous parallel running with the public supply should be encouraged and unrestricted. The gas industry should be encouraged to extend its products for generating power from waste heat and exporting the surplus to Area Electricity Boards.

These recommendations, although selected from a longer list, well serve to show the general lines of the Report.

It is pointed out that by taking over control of the production of coal, gas and electricity the State has accepted responsibility for the fuel services, and cannot therefore stand aside and permit waste or unsuitable use of these fuels to continue. Questions claimed to be awaiting solution are "Is it in the national interest that electricity, a costly and refined product, should be used for space heating except where gas is not available? Is it not essential, in view of industry's future needs for power that the functions of electricity be confined to the provision of power, light and certain specialised heat processes? Is not gas the right fuel to retain on tap for space-heating (occasional) purposes? Seeing that the base load of space heating can only be carried by solid fuel is it not in the country's best interests that smokeless fuels be used, particularly in the domestic sphere?"

Process Steam

After dealing with the various fuels available in America and Great Britain, the Report considers wastage of energy in British factories. Here it is stated that the fuel consumption of manufacturing industries could be cut down, in terms of fuel, by about 30% if measures were taken to utilise efficiently the works services.

In certain cases the introduction of steam accumulators and hot water accumulators has shown reductions in full consumption of 10 to 15%. In the United States, particularly in drying processes, automatic control is being introduced to prevent the common fault of overdrying.

A development of recent years, particularly in the case of new factories, is heat distribution by high temperature, high pressure water instead of steam. A wider and more general application of this system is recommended because it lends itself to accurate temperature control, eliminates feedwater conditioning, steam traps and condensate recovery problems and has the ability to meet fluctuating demands due to the high thermal storage capacity.

In a later section of the Report, comparisons are made between America and British techniques in the brewing industries, the textile industries, laundries and paper and paper board manufacture. Sections are also given on the general subject of industrial boiler plant, treatment of boiler water, instrumentation and control, standby plant (the Team thought there was too much capital tied up

in this in U.K.), mechanical coal and ash handling, smoke and costing.

Energy and Manpower

Dealing with energy and manpower, the team emphasises that the competitive position of the country in world markets is dependent on increased mechanisation. Presupposing that in 1950 the British worker could have been provided with double the amount of power then at his disposal, the total energy requirements for the manufacturing industries would have amounted to 46,716 million units, almost the total sent out for all purposes by the B.E.A. in the year ending March 31st, 1951. If we could have had parity with the American worker, the manufacturing industries would have absorbed 80,000 million units. It is assumed by the team that a logical (*sic*) target would be to have sufficient power available to permit the worker to consume 10,000 units/man-year and the sooner this target is achieved the better. Acting on this, they conclude that the B.E.A. programme up to 1966 is insufficient and even if it were, the coal consumption on present techniques would be too high. It is therefore suggested that the thermal efficiency of generation should be raised by widespread development of dual purpose stations, power production by industry encouraged, and the load factor raised by two-shift working. It is conceded that "to consider any limitation of future non-industrial electricity demand other than that used for continuous space heating and water heating would clearly be a retrograde step."

As can be seen, the Team has come down wholeheartedly for dual-purpose stations, and quotes a few special examples of these in the United States and in this country to show the savings achieved. These are unfortunately not dealt with in detail, and much of the important fundamental data on which an impartial assessment could be made is missing from this record.

Smoke Abatement

Amongst the relatively minor points discussed in the report, that of smoke abatement deserves some attention, because here there is considerable concern with U.S. practice. Many American cities have smoke abatement by-laws, and over 100 of them base these on an information bulletin, "Example Sections for a Smoke Regulation Ordinance," prepared by a widely representative committee meeting under the auspices of the American Society of Mechanical Engineers.

One major difficulty in operating a law enforcing smoke abatement in America in the past was the lack of a workable and acceptable definition of smoke. This is also a problem in this country. The information bulletin mentioned above uses the definition: "Small gas- and air-borne particles consisting essentially of carbonaceous material in sufficient number to be observable." For measurement purposes, a chart showing various shades from 20 to 80% black is generally used (the Ringelmann chart). Dust from boiler plants has also been defined, the wording being "gas- and air-borne particles larger than one micron in mean diameter."

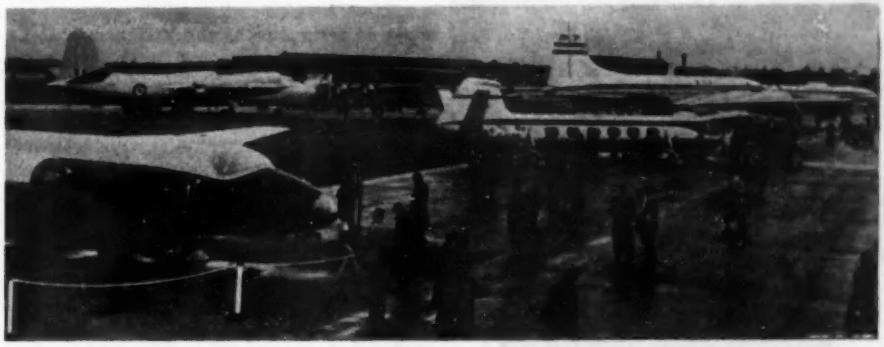
In America it was found that to enforce smoke abatement laws a comparatively complicated system of control, inspection and licensing is necessary.

Progress in Industrial Design

FOR the Council of Industrial Design, the year ending March, 1953, was one of reorganisation after the 1951 Festival of Britain. This fact provides a restrained note in the eighth annual report of the Council, which is published today. Amongst the achievements of Festival Year which were retained was the selective illustrated index of current designs, known as "Design Review." The Council invites all manufacturers in the industries covered by Design Review to submit particulars of their best products for inclusion.

One of the principal new activities undertaken in the year ended March, 1953, was responsibility for maintaining a list of approved designs of street lighting standards to be consulted by local authorities and other interested organisations. This work was undertaken at the invitation of the Ministry of Transport, and its main object is to improve the day-time appearance of lamp posts. In addition, however, the Committee appointed for this purpose hopes to have a good general influence on street lighting installations and on the functional aspects of a column, such as strength and durability. As a result of this work, lamp standards are now included in Design Review.

An older project which is prospering is the record of designers. This is offered as a free service to manufacturers who wish to find the right designers. There were nearly 300 applications for recommendations during the twelve months reviewed, an increase of 20% over the previous year.



Farnborough Air Show

AIRCRAFT ELECTRICS AT THE 1953 S.B.A.C. EXHIBITION

THE annual display and exhibition held by the Society of British Aircraft Constructors at Farnborough, is one of the most important world events in the field of modern aeronautics. While most attention is of course directed to the aircraft themselves, the exhibition of components and accessories is nevertheless of great interest in showing the progress being made in this specialised industry.

Airfield Lighting

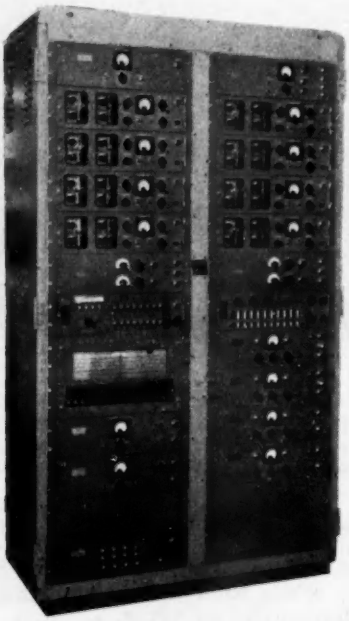
Much attention is of course directed to the problem of good, efficient and reliable airfield lighting. The British "line and bar," approach system, which complies with the International Civil Aviation Organisation rules, is demonstrated by G.E.C., who are also taking the opportunity to introduce a new low intensity runway and taxiway light known as the ZA 204. This has been designed for the lightest weight consistent with reliability and provides the minimum risk for aircraft. No glass is employed in its construction unless a colour system is required, the optical system consisting of an accurately machined cylindrical prismatic refractor of "Perspex" used in conjunction with a pre-focussed lamp. The refractor is permanently fixed in a spun aluminium gallery, and the light closed by a removable spun aluminium cap, held in place by a strong rustless spring. The complete light weighs only 1 lb.

A wide range of lighting equipment by Revo, for airfield use, includes floodlights, obstruction lights, unidirectional and omni-directional approach lights for pole or ground mounting, elevated and sunken taxi-way lights, sodium flares, cut-off fittings for road-way lighting, transformers, control gear and numerous other accessories.

Control systems for airfield lighting are a speciality of Standard Telephones and Cables Ltd. The popular light-current control system working at 50 volts is used, where only one core/(solidus) function for controls and indications is required. For large airfields a coding system is also available, designed to be infinitely extensible and operating over an initial 5-pair cable. It provides a speed of operation comparable with direct wire, and enables the whole airfield to be supervised on a miniature desk and diagram.

Engine Starting

Electric external supplies are frequently required for starting and test purposes. With present-day aircraft, starter motors may be required to develop over 100 h.p., and to satisfy this need the Crompton Parkinson-Auto Diesels unit has been produced. This comprises a diesel engine driving two generators giving continuous outputs of 450 amps, 112 volts and 750 amps, 28 volts. In addition the unit will supply peak starting currents of 850 amps, 112 volts or 2,000 amps at 28 volts. Simultaneous outputs for 28 volt servicing and 112 volt starting are permissible up to 100 kW. These units will be located at airports along the B.O.A.C. routes and will be used for the Comets and the Bristol Britannias.



This radio tele-typewriter receiving terminal P.VR.80, by the Plessey Group, provides four channels for F.S.K. working in the h.f. band 2-20 Mc/s

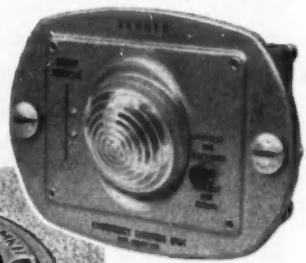
Where external a.c. supplies are available, the "Westruk" engine starter, by Westinghouse Brake and Signal Co., can be used. This in its Service Type 960 version can supply 300 amps at 28 volts d.c. or a peak output of 1,500 amps for starting.

A rectifier starter unit by Standard Telephones and Cables employs SenTerCel selenium rectifiers and is designed for use with Viscount aircraft. It has an output of 2,000 amps at 24 volts for 2 seconds and of 900 amps at 27.4 volts during cranking. An alternative switch position provides a continuous output of 400 amps at 28 volts for testing purposes.

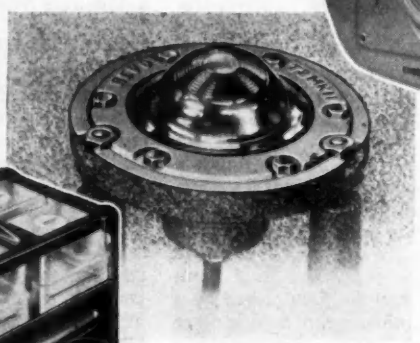
Liquid and solid fuel starters for gas turbines are being exhibited both by B.T.H. and by the Plessey Group. The same firms also have high-energy igniter systems for firing the fuel initially in the combustion chambers of the gas turbines.

Batteries

Probably no single factor has given so much stimulus to the battery makers as the requirements of the aircraft industry. Chloride Batteries Ltd. are showing a comprehensive range of Exide batteries for every type of civil and military aircraft. Of particular interest are the ZC and ZCS ultra-lightweight 24-volt batteries in monobloc moulded polythene containers. The nominal capacity ratings of these batteries are 25 Ah and 15 Ah respectively at a 20-hour rate of discharge to a final voltage of 21·6 volts per 24-volt unit. At the 20-hour rate their output is equal to about 10 watt-hours/lb and 13 watt-hours/lb for the 15 Ah and 25 Ah batteries respectively. For lower voltages are the Exide FZZ 12-volt units which are shown in the two capacities available, 40 Ah and 63 Ah. Two new unspillable types for service and aerobatic flying use, and heavy duty capacity units for ground starting complete



Above is shown Venner's unit for aircraft emergency lighting

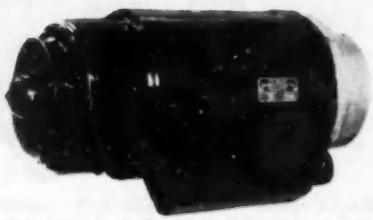


The cast-iron taxiway lighting unit by Revo (above) has a lens of toughened glass. Left, the redesigned Peto and Radford ultra-lightweight battery for the Comet

the extensive display of this company.

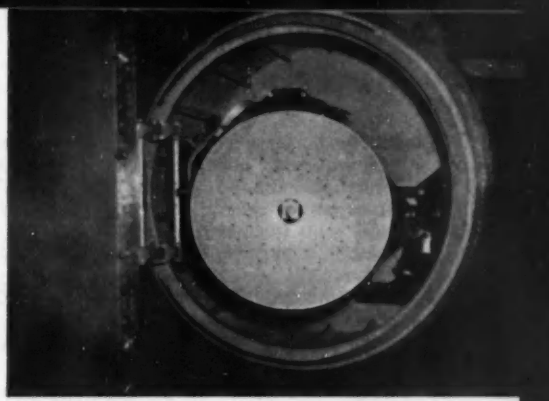
Peto and Radford have on view the Dagenite 6-EP19-B/1 battery designed for the Comet, with the low weight/capacity ratio of 12 oz per Ah. High-impact toughened polystyrene is employed for the cell containers and lids. New 24-volt 25 Ah batteries have been designed for the Comet II and six of these will be fitted in each machine to supply the much extended electrical services. Five in series will provide current for engine starting at 110 volts, and for general duties the six units will be paralleled to give a total capacity of 150 Ah at 24 volts.

Oldham and Son Ltd. have a 24-volt 40 Ah battery which is produced in two arrangements dimensionally interchangeable. One, the Type "H" battery, is for use on a number of British jet aircraft, and the other is



On view at Farnborough is this 39 kW, 130V, d.c. generator running at 3,200/4,000 r.p.m. by B.T.H., for use in flying boats

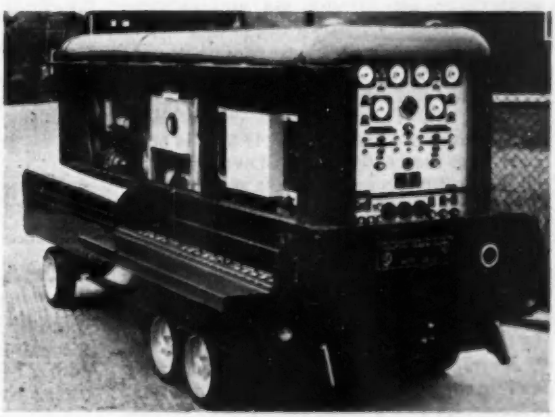
essentially a replacement for the U.S. Type An. 3150 as used on Constellation and other American commercial machines. The military unit can cope with discharge currents up to 1,000 amps and has been used to start the largest available jet engines. Other airborne batteries with sufficient power for starting purposes are the Type "C" 12 volt units with capacities of 40, 25 and 15 Ah. Ground batteries for starting, and miniature and special batteries are also included. Venner are showing some of the ultra-lightweight accumulators based on silver-zinc reaction which have exceptional power weight ratio advantages over their lead/acid equivalents.



Ekco airborne search radar. Here is the scanning unit fitted in a Comet 1 aircraft

The central feature of the B.T.H. stand shows all the components and main connections associated with the power circuit of one of the four parallel generating units on the Comet. The layout includes the alternators; rectifier; voltage regulators; circuit-breaker; relays; equaliser resistor and other items. In operation an alternator is directly coupled to each of the four aircraft engines and is rated at 8·5 kVA (unity p.f.), 3-phase over the speed range of 3,500/10,000 r.p.m., the base frequency being 400 c/s at 8,000 r.p.m. The entire output from the alternator is rectified to a nominal voltage of 24 volts d.c., and the four d.c. output each of 250 amps, can be paralleled to give a total output current of 1,000 amps. A.C. supplies are provided by motor-generators or rotary invertors to give 26 volt, single-phase, 400 c/s; 115 volts, 3-phase, 400 c/s, and 115 volts, single-phase, 1,600 c/s.

Although this system is not adopted universally, there is nevertheless a great require-



Crompton Parkinson Auto-Diesels mobile aircraft starter and service unit for the Comets. It will supply outputs at either 28 V or 112 V and can supply up to 100 kW simultaneously on both

ment for airborne rectifiers, and lightweight aluminium-based units are being shown by Westinghouse Brake and Signal Co., together with numerous examples of other types of rectifier units for magnetic amplifier circuits, wireless, radar and instrument use.

For control duties are the Venner magnetic relays with 4-pole 2-way 10 amp 24-volt d.c. contacts and double pole 2-way 25-amp 24-volt d.c contacts. These are available with pressed aluminium and moulded plastic cases.

Aircraft cables, featuring the "Pren" type which is insulated with polychoroprene, are a feature of the British Insulated Callender's Cables stand. For special conditions where operating temperatures are liable to range from −50°C and +150°C are the "Glasil" cables and for temperatures between

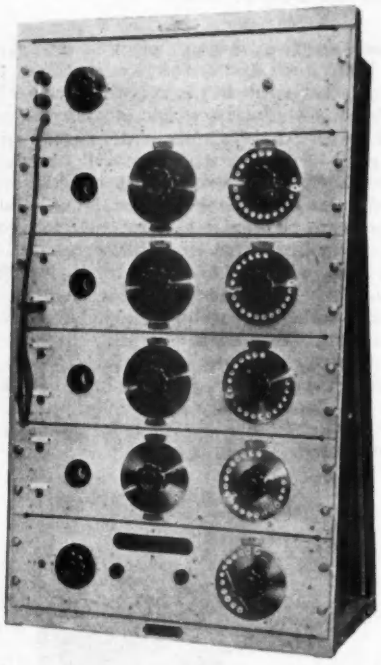
Known as the ZA204 this is the new G.E.C. runway and taxiway lighting unit

−75°C and +250°C are the "Glasef" series. Also on show are flexible miniature cables designed to meet the requirements of M.o.S. (Air) Specification E.L. 1228 for local interconnections for ground, sea and airborne instruments and electronic equipment.

Amenities

A new form of cockpit lighting for this country, the Thorn Plasteck (made under licence from the Plasteck Inc., U.S.A.)is being shown on the I.C.I. (Plastics Division) stand. This uses indirect red light of a specific wavelength to give good cockpit illumination combined with ease of operation and reduced personal fatigue. It is claimed that maximum visibility both inside and outside the aircraft can be maintained as the pilot's eyes remain dark-adapted. A demonstration of this form of lighting is shown.

As might be expected radio and communication equipment is well to the fore. Ekco Electronics Ltd. are showing new suppressed



Above is shown the precision H.F. measuring equipment exhibited by Salfords Instruments

aerials, the Ekco airfield approach aid and an airborne search radar. A light compact v.h.f. communication set with 22-channels, simplicity of operation and low battery consumption is also on view.

Salford Instruments have produced a new instrument which enables even an unskilled operator to make rapid precision frequency measurements by direct reading. The range of the equipment is from 1 c/s to 10 Mc/s.

Plessey have the P.T.R. 61 transmitter receiver in the 116-132 Mc/s band and the Tele-typewriter receiving terminal equipment type P.VR. 80 which is designed for unattended operation and provides four channels for F.S.K. working at 2-20 Mc/s.

Plastics in many different forms including several new products are being exhibited by Bakelite Ltd., while Hymatic Eng. Co., have produced several new hydraulic valves and other equipment. Special attention has been directed to the problem of closely controlling hot-air bled from gas turbine engine compressors for fuel system pressurisation and the maintenance of positive tank pressures during high rates of dive. Fibreglass reinforced laminates and copper clad laminates are exhibited by Ashdowns Ltd.

ELECTRICITY and SCIENCE

Engineering topics are prominent at Liverpool British Association Meeting

ELECTRICAL engineering was unusually well represented at the British Association's annual meeting which finished in Liverpool yesterday. This was particularly appropriate in that the president for this meeting was Sir Edward Appleton, who has made so many contributions to the light current side of the industry. President of Section G, Engineering, was Lord Dudley Gordon, Chairman of J. & E. Hall Ltd. The addresses of these gentlemen gave a wide-sweeping review of science and technology, but in this summary of the meeting attention will first be given to the more specifically electrical papers.

Dielectrics

First amongst these may be placed a review by Dr. S. Whitehead (E.R.A.), of recent progress in dielectrics. A design of any engineering product must be mechanically sound, so insulating materials were chosen in the early days for mechanical suitability. They were then improved from the electrical point of view, though at first this did not amount to much more than the removal of, and preservation from, electrolytic impurities. Gradual advances were made, and eventually empiricism gave place to the search for types of structure and composition which on theoretical grounds, could be expected to yield good electrical results. For much of this advance credit is due to Professor Fröhlich.

Certain main principles have been evolved. For instance, it is found that certain atoms tend to be more tightly bound in combinations, and thus more resistant to thermal activation, ionisation and chemical attachment. Silicon and sulphur may be preferable to carbon, fluorine and chlorine to hydrogen, and nitrogen to oxygen. Further, since the insulating property arises from an absence of free electrons, there are advantages in having an atomic structure as free from imperfections as possible, for these may loosely trap electrons and later release them because of thermal agitation. Another principle concerns the relaxation spectrum of solids, dependent, upon the rate at which dipoles can reverse themselves.

Polythene is an example of material excellent electrically (a hydrocarbon) which has been improved thermally and mechanically by polymerisation to give longer molecules. By replacing the hydrogen by fluorine as in P.T.F.E., the temperature range and mechanical strength are increased, while, a softer material is obtained if one fluorine atom is replaced by chlorine, giving P.T.C.F.E. In this latter material, however, the loss angle increases rapidly. Polythene can be cross-linked and given improved properties in a remarkable way by neutron bombardment in an atomic pile.

Plastic mouldings and glass bonded mica may be likened to concrete, in that the filler is bound by resin or glass; laminates like varnished paper on this analogy resemble reinforced concrete. If the paper is replaced by glass, terylene or nylon, some advantages are obtained, while a silicone binder or certain resins can exploit the properties of high temperature, moisture discharge, tracking resistance and low loss. Costs, however, are high, and there are bonding difficulties as between glass and silicones.

Ferro-electrics have been produced which form domains and have many properties analogous to magnetic materials—a Curie point and electrostriction. With them a dielectric amplifier can be made similar to the magnetic amplifier.

Nuclear Power

Few scientific conferences would be complete without a reference to nuclear power. At Liverpool the introduction was provided by Dr. B. L. Goodlet (Deputy Chief Engineer, A.E.R.E., Harwell), with an estimation of the outlook for economic nuclear power. He notes that nuclear power will start as an offshoot of the atomic weapon industry, and that by building reactors to produce plutonium with operation at a high temperature, the cost of operation can be spread over both plutonium and electric power. Unfortunately, there are definite

design conflicts in such dual purpose plants, and this has led to interest in breeder reactors which produce more fissile material than they consume. Here the difficulty is the cost of the repeated chemical processing of the fuel, which is an essential feature of the breeding cycle. The general picture is thus that the natural uranium reactor has relatively low operating costs but is wasteful of fuel, while the breeder reactor achieves efficient fuel utilisation at great expense.

Nuclear physics research work was touched on by Professor H. W. B. Skinner (Liverpool University), who gave an account of particle accelerating machines. There are two main lines of work to be tackled in this field. First, comes "nuclear spectroscopy," the attempt to understand in detail the energy levels of the nuclei of the atomic species in a way analagous to atomic spectroscopy for the atoms themselves. Then there is the "new particles work" resulting from the discovery of a whole range of new particles of mass intermediate between the masses of the electron and the proton (and in one case slightly greater). The first line of investigation requires the production of intense beams of particles at accurately controlled energies up to 20 MeV while for the second, the highest energy possible is required.

Pressurised van der Graff equipments give energies up to about 8 MeV. Beyond this the most straightforward machine is the linear accelerator, in which the particles travel in a straight line between gaps, an accelerating voltage of the right phase being applied; alternatively the gaps may be dispensed with and the electrons accelerated on the crest of a pulse down a waveguide.

The second method is to bend the particles in a strong magnetic field, using a single gap. Simple cyclotrons are suitable up to 25 MeV, but beyond this the relativistic effect destroys the phase relationship between the particle and the applied voltage. To put this right r.f. voltage, or frequency or magnetic field must be varied. In the long run, linear accelerators are likely to be used on grounds of intensity and ease of beam extraction. The most exciting development in coming years, however, will be the proton-synchrotron, which will ultimately give energies matching those of cosmic rays.

Solar Energy

A far older source of energy, the sun, was discussed by Dr. H. Heywood (Imperial College). In some ways this is complementary to the development of power by nuclear fission. This latter is the hope for large power stations serving highly concentrated industrial communities; solar energy may bring power and other amenities to isolated communities in underdeveloped areas, by means of relatively small units.

Factors involved in the use of solar energy are the air mass (a function of the depth of atmosphere through which radiation passes), the altitude factor (position of collecting surfaces) and the cloud factor. It is the last that constitutes the greatest handicap to solar energy, and makes effective use very difficult in temperate latitudes. In England, for example, total radiation may on rare occasions be as great as in tropical countries.

Direct experimental work by Dr. Heywood and his collaborators in this country has been largely concerned with the collection of solar energy as low grade heat which could be used for domestic purposes. On a more ambitious scale the possibility of small electrical generators or pumping units has to be considered. The thermodynamic engine efficiency increases with the upper temperature limit of the working fluid, and would thus be greater with focused-mirror systems. However, the expense might be disproportionately greater than for a simple absorber of low efficiency. Dr. Heywood is convinced that small power units of 5 to 10 kW could be successfully operated, and would have a useful field of application. It is inevitable, however, that such units would be expensive, and that their construction could only be undertaken at first by assistance from national sources.

Domestic Heating

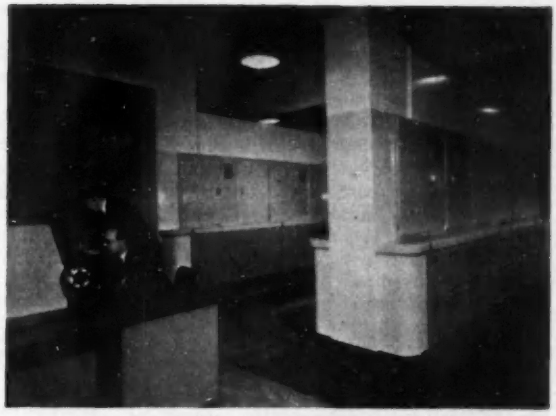
In a paper on district heating, Mr. A. E. Margolis (Kennedy & Donkin) recalls that the average thermal efficiency of all B.E.A. power stations was 22% in 1952; by 1956 it is hoped to achieve 26%. The average thermal efficiency of open fires may also be taken as 22-26%. By co-ordination of electricity and heat generation with district heating, however, the thermal efficiency can be increased up to 80-85%. The Hamburg district heating scheme initiated by Mr. Margolis in 1921 was damaged during the war, but last year the total output was 34m therms. Popularity is indicated by a total new load of 80m B.Th.U./hr; this with an arrangement whereby capital costs required for distribution mains and apparatus in buildings are met by consumers.

The Pimlico heating scheme in this country is now in operation with about half its final load, and is working "completely satisfac-

torily." A hot water accumulator is the main feature of the plant. It has a useful heat storage capacity of about 5,000 B.Th.U. cu ft (about twenty times that of a town gasholder) and has annual heat losses of less than 1%. Capital cost of large capacity heat accumulators do not exceed those of the cooling towers of some condensing power stations.

Measuring the efficiency of heating in buildings introduces some problems which were discussed by Mr. A. T. Pickles (Building Research Station). The general subject of the efficient use of fuel has at present too great an area of opinion as against factual knowledge. Since 1946, the Building Research Station has been conducting a series of detailed experimental researches on the heating of buildings in an attempt to improve the position. One result has been "the rehabilitation of the open fire, in an improved version and fitted with a back boiler as the recommended heating system for small houses."

By and large, however, the experimental results have emphasised that the possibilities of fuel saving in buildings are related to the needs and habits of the occupants, and the use of the buildings. Various types of building are found to have special features which are almost, if not equally, as important as the primary requirements of efficient combustion and good thermal insulation.



A general view of the Manchester electronic computer

Calculating Machines

For once electrical engineering has a stake in the papers, presented to the mathematical sub-section of the Association. This has arisen through the calculating machine, whose possibilities were discussed against a broad background by Professor L. Rosenhead (Liverpool University). He entitled his paper "Society and the Calculating Machine," and he emphasised at the outset that computers are the product of the joint skills of the engineer and the mathematician. Moreover, despite some popular Press statements, they employ no principles not previously known.

In Great Britain at the present time there are only about 20 electronic calculating machines, 10 in working order, the others being developed. In comparison, reports from the U.S.A. suggest that 15 such machines are in constant use while as many as 150 are under development. It is interesting to note in connection with design and development work, that quite a number of the digital machines which in their final form are general purpose instruments actually started with a special purpose objective. In each case the designers found, independently, that it was as easy, and much more satisfactory, to produce a general purpose machine which would include the special purpose amongst its functions.

Not all computation tasks are best carried out by digital computors: they are best suited when there is comparatively little data on which much computation has to be carried out. When the opposite conditions exist (much data, few operations), punched card methods have many advantages.

Finally, Prof. Rosenhead considered the uses of computers. He quoted as one spectacular example of the savings they can bring about, an oil field problem. Every year an enormous quantity of oil is lost by evaporation. Because of the speed at which electronic computers work, it may be possible to perform calculations on site that will indicate how conditions of flow should be varied so that the vapour is converted into a liquid and saved. A rather different duty is the elimination of error in the calculations of very large organisations, such as National Insurance. The prospects here are so important that there is a D.S.I.R. committee studying them. But perhaps the most important advantage of the electronic computer is that it may remove the need to over-simplify problems in order to tackle them mathematically.

Examples of the application of digital com-

puters in engineering practice were given by Mr. R. K. Livesley (Manchester University).

Programming—preparing the instructions for the machine—is the crux of the problem of economic use. If a non-repetitive problem would take more than four weeks to solve with the aid of a desk calculating machine, then it is probably worth programming. Smaller jobs are best carried out by hand. Most problems, however, are repetitive. There are several sets of data, and the same calculations have to be carried out on each. Design is an example: the development of a complete set of turbine blading profiles might be possible, with the detailed dimensions needed for manufacturing drawings as the output of the machine.

Work that has been carried out includes the calculations of the critical speeds of turbine shafts having three or more bearings. The four lowest critical speeds can be obtained in half an hour to one hour on a computer, according to the number of degrees of freedom involved. Thermal gradients are allowed for. Such problems are mostly a matter of linear algebra so far as the mathematics are concerned. The Manchester computer will solve 30 linear equations in 2¼ to 4 minutes and invert a matrix of similar size in 7 to 12 minutes. Moreover, digital computers can conveniently set up a matrix from the original drawing board data.

The use of punched cards, mentioned above, was discussed further by Mr. A. Young (Liverpool University). He emphasised the value both of the full punched card and also of the edge-punched type which can be manually sorted with a knitting needle.

In solving some problems, of course, an electro-mechanical analogue is more useful than a digital computer. The general problem was discussed by Mr. R. Yorke (Southampton University). The advantages of using electrical analogies include that of bringing the mathematical methods developed to deal with complicated electrical circuits to bear, unchanged, on mechanical problems without modification.

Magnetic Steels

Calorimetry has not been much used by electrical engineers, although there are exceptions, such as the measurement of alternator losses by the continuous air flow method, and the measurement of dielectric losses. Mr. K. L. Morphew (Southampton University) described an application in the testing of magnetic steels. Usually loss measurement in such cases is made using a wattmeter, a.c. bridge, or a.c. potentiometer, while the frequency of magnetisation and the mean magnetic induction are held constant. Care has then to be taken that harmonic distortion is either allowed for, or else prevented from affecting the result.

It is hoped that this work will give a value for the specific heat of electrical steel, which is not at present available. In particular, the effect of silicon and carbon content of the laminations, and of surface scale (2 to 5% of total mass, and 7% by volume respectively) can be examined.

Titanium

In the last few months an increasing amount has been heard of titanium. It was evaluated as a metal of engineering importance by Mr. P. L. Teed (Vickers-Armstrong). Although Mr. Teed's concern was naturally with aircraft, where the metal's comparatively light weight and good temperature characteristics are of special value, he nevertheless gave a useful general survey of its engineering properties.

In common with most other engineering materials, titanium and its alloys are extremely costly (£3 10s/lb for hot rolled bars at U.S. prices). The mechanical properties of commercially pure titanium are comparable with those of mild steel, except as regards its Young's modulus. This is about half that of a ferritic material and one and a half times that of an aluminium one. Mechanical properties of titanium alloys (excluding Young's moduli) are at room temperatures comparable with those of most alloy steels. Since the specific gravities of titanium alloys are between 4·3 and 4·7, their room temperature specific mechanical properties (other than elastic moduli) are very high.

Like alloys of other metals, titanium alloys are heat sensitive. Above 100°C they have better mechanical properties than the wrought aluminium ones under comparable conditions, but at temperatures in excess of 400°C there are several alloys with superior properties. Above 800° C nitrogen, oxygen, steam, carbon monoxide and carbon dioxide react somewhat vigorously with the hot metal. Titanium and its alloys have high melting points as compared with alloy steels.

Considerable difficulties are involved in working the metal, and its alloys. Castings for most purposes cannot be made, forging is costly (more than for alloy steels) and welding calls for special techniques. Machin-

ing is more difficult than with austenitic steels. Finally, one good point and one bad. Titanium and its alloys are resistant to many forms of chemical attack, notably sea water even when hot; but their rubbing properties are very small.

Summing up, it seems that a present prices titanium will have few applications except where weight is of paramount importance, or the special chemical properties are required.

Lightning

Prof. J. M. Meek (Liverpol University), on the opening day of the meeting, introduced a session on lightning. He said that over the earth's surface, about 100 lightning discharges occur each second, and as there are about 50 MV involved in each discharge, with about 20 coulombs of charge concerned, the resultant energy amounts to 100,000 MW.

Most discharges consist of a series of multiple strokes, each consisting of a leader stroke and a return stroke. The first stroke may travel from cloud towards ground at an average speed of 20 m cm/sec—equivalent to half a million miles per hour. This stroke leaves an ionised channel along which a return stroke from ground to cloud develops at about 2,000 m cm/sec: nearly one-tenth the speed of light. Then further strokes may occur. Such natural phenomena is being studied on a laboratory spark scale to produce a quantitative theory.

But why do lightning strokes occur at all? This point was discussed by Mr. B. J. Mason (Imperial College). He described a thunderstorm as consisting of one or more cells which contain strong vertical air currents (up to 60 m.p.h.) and are the seat of raindrop- and hailstone-formation and of lightning activity. A cell may be one to five miles wide, and it is typically 20,000 ft in depth. Duration of precipitation and lightning from a single cell is about 30 minutes on average. The development of violent precipitation appears to be necessary for violent electrical activity in a cumulonimbus cloud, the central lightning area usually being coincident with the area of highest rainfall intensity. When clouds are examined by radar, the first lightning flash occurs about 10 to 20 minutes after the appearance of the first radar echo, which indicates the presence of raindrops or large ice crystals.

Mr. Mason is convinced that thunderstorm electrification is associated with the growth of ice pellets (soft hail) in the cloud. Such ice pellets when manufactured artificially in the laboratory are found to acquire a negative charge. They would fall relative to the air in a thundercloud, and carry their negative charge downwards. The positive charge would be carried to the top of the cloud either on ions, small cloud droplets, or small ice crystals, to give the correct charge distribution.

The Pimlico scheme hot water accumulator

Calculations show that this mechanism can produce between 500 and 1,000 coulombs of charge in a cell of radius 2 km within 11¼ minutes of the initiation of the first ice crystals. Thus it appears, at first sight, to be a very likely mechanism.

Presidential Addresses

Two presidential addresses have already been mentioned. Sir Edward Appleton turned to the "radio stars" for an example of science for its own sake, and at the end of his fascinating address said he had tried to show how science, pursued for its own sake, can enlarge men's horizons and invest the world with deeper significance. He took care, however, to emphasise the need for, and importance of, "enduring and sustaining values of the spirit." Lord Dudley Gordon, as befitted his association with the Engineering Section, had a more practical approach, with a survey of engineering in the next 2,000 years. His visionary ideas included control of the force of gravity, the exploitation of sub-ocean deposits, and the development of isothermal chemical reactions.

PROBLEMS AND PRACTICE in Engineering

Wrong Brush Position

RECENTLY a 2-pole small d.c. motor was sent into the workshop for repair, the complaint being severe commutator sparking coupled with running at excess speed. As the motor was of the fixed brush type neither sparking nor speed could have been affected by this factor. Although the field winding had been rewound just prior to the fault appearing, the number of turns had not been altered. The armature, too, was quite in order, albeit a little worn, and no fault—such as a high bar—could be discerned anywhere in the commutator.

There was nothing for it but to strip down the motor and make a complete examination. As the work proceeded the field connexions were checked for a possible faulty joint, from which the field coils themselves were noticed to be in a somewhat unusual position. The geometrical field axis was displaced about 10-20° from the horizontal, a state of affairs which was likely to have some bearing on this fault as the brush axis was vertical.

On connecting the machine to the supply after having moved the field casting so that the poles were horizontal and re-assembled the motor, the sparking had disappeared whilst the speed was normal. It is apparent that moving the field was tantamount to having a wrong brush position. Commutation was therefore proceeding whilst the associated armature coils were still cutting pole flux, giving rise to heavy currents and consequent sparking at the brushes.—*L. W.*

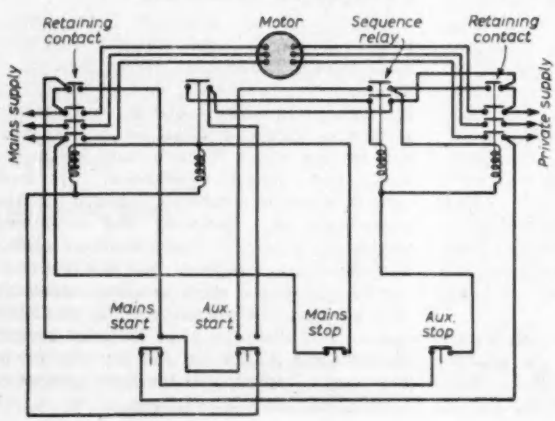
Cutting it Fine

WHEN taking a fine finishing cut in turning it is not always easy to ensure that the tool is just touching the metal surface, its bright surface masking cuts of only a few ten-thousandths of an inch in depth. Although some engineers have taken the trouble to rig up a magnifying glass holder on the tool post, so that the work may be viewed constantly through it, if such fine work is undertaken only on few occasions this labour is not really justified. I have found that smoking the surface of the metal with a taper or candle flame suffices to show when the tool is up to the work, by allowing it to skim off the layer of soot.—*P. N.*

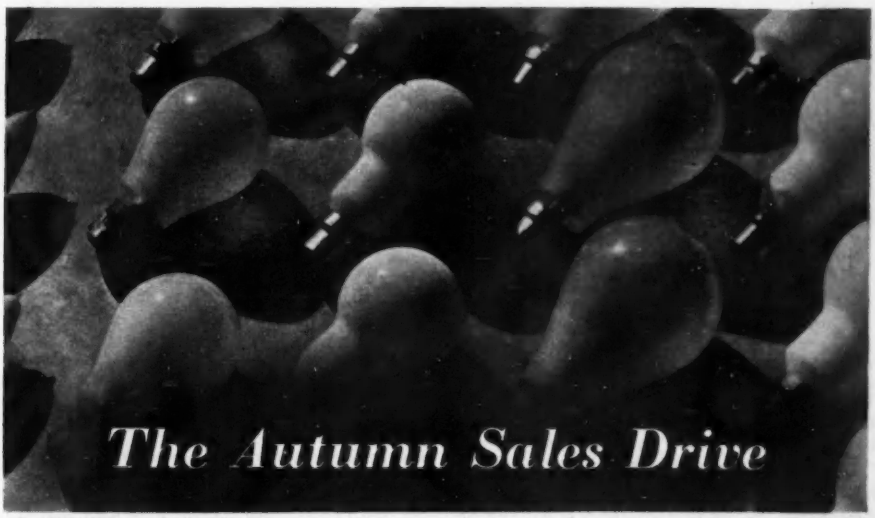
Starting a Synchronous Motor

A SYNCHRONOUS motor was to be started across the mains, and then switched to run on an auxiliary supply of a slightly different frequency. Synchronisation of the two supplies was undertaken by our customers, but we were required to achieve the starting and changeover using push-button control, and, since the time factor was of prime importance, we were to use standard components from stocks. The main condition laid down was that it was to be impossible to start the motor on the private supply.

The accompanying diagram shows how the problem was overcome with the aid of two 3-phase starters and two simple relays. It will be seen that in practice the sequence of operation called for is achieved, so that even simultaneous pushing of two or more buttons becomes ineffective, and obviously, had we had a four-pole contactor, the single-pole relay would have been unnecessary.—*D. H.*



Here is seen the circuit and components required to ensure correct starting of the synchronous motor



The Autumn Sales Drive

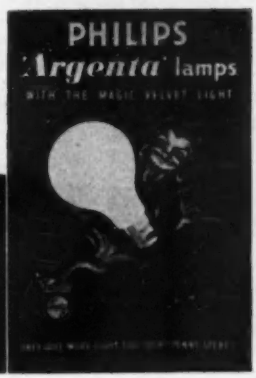
A SHARP reminder that summer will soon be at an end and that the hours of daylight will become shorter is the advent of the new season's lamp campaign. To electric lamp manufacturers falls the task of providing the necessary brilliance indoors to replace the loss of daylight outside, and it is the concern of each manufacturer to ensure that his brand of lamp is brought to the notice of customers. Each autumn, therefore, brings keen rivalry in the production of sales aids and advertisements. The autumn lamp campaign begins this month and once again there are numerous attractive display aids in the form of colourful posters, showcards, cartons, and the like, available to the dealer. The importance of this seasonal campaign may be assessed from the fact that at this time of year sales of lamps double those of the preceding summer weeks.

Window Displays

The trader who is looking for a complete display to enhance his shop window, need look no further than to the **British Thomson-Houston Co.**, who have prepared two displays which may be booked in advance. Each has been based on a centrepiece which initially can only be supplied when a window is professionally dressed by the company. The centrepieces consist of transformation scenes controlled by a flasher. One shows a man awakened by ghosts, captioned "At night imagination's stronger . . . but Mazda lamps stay brighter longer"; and the other a cut-out of a woman sewing by the light of a correctly positioned lamp.

The familiar slogan (the latter half of the caption already mentioned) appears in both, and attention is also drawn to the pamphlet "Lighting to Measure", which gives much good advice on lighting in the home. Individual items in these displays, other than the centrepieces, may be obtained separately.

Slogans are, of course, an integral part of any publicity campaign, and another which will appear again this year is the **Metropolitan-Vickers Electrical Co.'s** "Best lights in the world, Daylight—When daylight fades, Metrovick lamps." This will in fact be the basis of cutouts, showcards, and window displays, all of which are available on request.



Ekco-Ensign's full colour showcard measures 12 in. by 8 in. Right, Philips 16-sheet poster for London Underground system and [the provinces

Metrovick's showcard, 19 in. by 13 in., produced in ten colours

A two-plane cutout unit measuring some 30 in. high and 24 in. wide, has been printed in eleven colours, while a showcard measuring 19 in. by 13 in. has been produced in ten colours. Self packing portmanteau type window features embodying new displays and about 3½ ft in height are again available. Up to four of these units can be arranged as a composite display.

Dealers will also note that a new edition of the lamp catalogue is being printed. The layout has been revised to facilitate speedy reference, and notes have been included which answer typical questions often asked by customers. Incidentally "Dayglo" fluorescent ink has been used on the cover.

Poster Campaign

A slogan which has been altered slightly this year is that advocating **Crompton** lamps —the more forceful "for life" being added to "Switch to Crompton lamps." Accent, however, has been placed particularly on the poster campaign following previous successes, and lamp advertising has been linked with posters for the new car starting battery which appear with a similar slogan. This year also will see a revival of the company's film "Looking on the Bright Side." Well received three years ago, the cartoon will be shown at about 500 leading cinemas throughout the autumn and winter. The "happy switch" will again be featured on a number of showcards, posters and similar material.

On the advertising side, as opposed to sales promotion, particular emphasis has been laid on an approach to the women, space being taken in many women's journals. As regards literature there are counter leaflets, price lists, the popular Reference Book, and price cards.

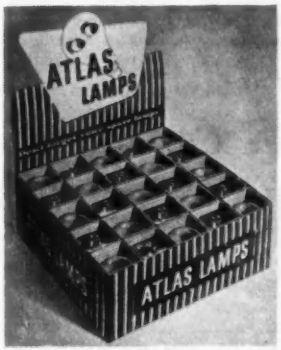
Another firm whose poster campaign forms a prominent part of their promotional activities is **Philips Electrical.** An extensive 16-sheet poster campaign is being arranged for the provinces and a new design employed. The Argenta lamp is advocated this year by a very genial genie who points out that more light is given for every penny spent. The Press-and-Compare counter unit is again available. This allows the customer to compare the Argenta lamp with the Pearl type, but additional interest is created by a full-size cutout of a charming young lady holding the company's lamp carton. She appeals to the customer with the slogan "Take a spare Argenta lamp now."

More specialised items include counter displays for Photoflux flashbulbs, and show-

One of two elaborate displays prepared by B.T.H.; and Crompton Parkinson's "happy face" counter display

cards for darkroom and internal reflector photoflood lamps. New publicity material for infra-red lamps is being prepared.

Reference has already been made to the literature which accompanies many of the dealer's display aids, but this item is to form the major part of **Ekco-Ensign's** new lighting programme. A comprehensive booklet is being prepared detailing and illustrating all the company's products for fluorescent and tungsten lighting and all their industrial, commercial and decorative fittings. Other items include a new pocket-size catalogue, colourful broadsheets and leaflets. Counter and window displays will be enhanced by full colour showcards and by a new display outer which is compact and acts as a reminder that spare lamps should always be at hand. The same advice comes from **Thorn Electrical Industries,** on their eye-catching counter display carton. Red and yellow candy stripes form a gay background to the blue and white design of the new Atlas lamp pack which carries the top layer in each box of fifty 100 W lamps. The same advice appears on a showcard showing a knotted handkerchief, and on a basket-shaped display unit which opens to hold about six lamps. "All the better to see with" is the slogan used again this year. Lighted signs are also offered to shopkeepers, prominently displaying the brand name. Incidentally, these display aids are backed by the company's "biggest ever" poster advertising campaign.

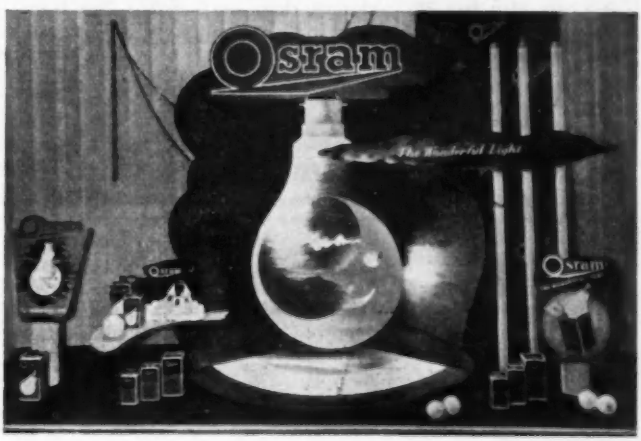


Bright colours make this carton stand out

Brand Names

The brand name is, of course, the predominant consideration in these sales campaigns, and the **General Electric Co.** has adopted "Ask for Osram" as the theme for their activities this autumn, although "Osram the wonderful light" is again the catch - phrase employed. The quarter moon completing the outline of a lamp, used in the design of the poster, also forms the basis of a display piece, which in turn can become the centre of a large window display. Another centre-piece for a window display features the well-known humorous characters with lamps as heads. Rhyming couplets and copy explain the advantages of good lighting in the home in this instance. There are numerous other cutouts which can be obtained individually. Catalogues and other types of well illustrated literature to support dealers' efforts will also be available on request as before.

1953 edition of Philips life-size girl cut-out in yellow



One of the G.E.C.'s displays incorporating their poster design for this year

BRITISH STANDARDS

Electricity Meters. Part 3: Single-phase two-wire prepayment meters. *B.S.* 37: *Part* 3: 1953. *Price* 4*s. net.* Dealing with single-rate (flat rate), multi-rate (load rate) and two-part tariff prepay-payment meters for a system voltage not exceeding 250 V, this standard specifies two standard ratings of 10 amp and 40 amp corresponding to the maximum continuous rated current. Apart from the normal electrical requirements, specifications include details for the coin register and credit and debit indicators. For the energy register, requirements for circular scales are given. Limits of error and type tests, including power loss and error changes due to variation in voltage, frequency and ambient temperature and to stray fields are specified, together with appendices relating to these tests. The latter conclude with recommendations for future designs.

Circular Gear Shaving Cutters: Accuracy. *B.S.* 2007: 1953. *Price* 2*s. net.* To form part of a series dealing with gear forming tools, this new standard is concerned solely with the accuracy of these cutters, when intended for production of gears of an accuracy comparable with Class A1 of B.S. 1807.

Copies of the above standards may be obtained at the prices stated, from the British Standards Institution, Sales Branch, British Standards House, 2 Park Street, W.1.

Selling Vacuum Cleaners in Canada

IS it worthwhile trying to sell British vacuum cleaners in Canada? To assist manufacturers in answering this question the Exports Services Branch of the Board of Trade (Lacon House, Theobalds Road, W.C.1) published last week a revised report on the Canadian market for vacuum cleaners. Compiled by the U.K. Trade Commissioner Service in Canada, the report describes briefly the requirements to be satisfied in successfully retailing these appliances, for which there is a total market of approximately 200,000/year.

No import restrictions exist, but vacuum cleaners are dutiable at 5% *ad valorem* under the British Preferential Tariff (whilst duty at the rate of 20% applies to the U.S.A. and other foreign countries). A Sales Tax of 10% and an Excise Tax of 15%, both on duty paid value, are also leviable, although these are revenue taxes and apply equally to Canadian manufacturers. Approval of all electrical appliances is based on the Canadian Electrical Code, which has the force of law by legislation in each Province.

Approximately 80% of the vacuum cleaner trade in Canada operates by direct door to door selling by salesmen employed by manufacturers or authorised dealers. Many are specially trained and hence become an important medium for both presentation and advertising. Salesmen usually work on a commission basis, with no salary. In the case of imported vacuum cleaners, branded machines are sold by this method if the manufacturer has the necessary organisation. Otherwise, and for unbranded machines, cleaners would be sold to the public through department stores and other retail establishments who also undertake presentation.

Of the three types of cleaner at present marketed, the cylinder or tank type is easily the most popular, outselling the upright or bag type by three to one. On the other hand, considerable publicity is being given to a third type which has been on the market for only a short time. This is the upright canister type which has recently been adopted by several manufacturers in the U.S.A. Considerable emphasis is given to styling both as a design improvement and as a "selling point." Moreover it is regarded as essential to have a Dominion-wide service organisation carrying adequate replacement stocks.

CANADIAN IMPORTS OF VACUUM CLEANERS (FLOOR MODELS)

Exporting Country	1950		1951		1952	
	No.	Value ($1,000)	No.	Value ($1,000)	No.	Value ($1,000)
United Kingdom	58,617	1,216	42,078	912	41,100	917
U.S.A.	11,925	472	10,061	457	22,893	1,023
Denmark	104	4	—	—	4	—
Australia	—	—	100	3	—	—
Netherlands	5,685	158	5,556	164	3,661	112
Sweden	740	55	1,039	76	241	16
Total	77,071	1,905	58,834	1,612	67,899	2,068

Power Progress in South Africa

ESCOM'S Report for last year gives indications of extensive commissioning during 1954

PROBABLY the greatest step forward last year in easing South Africa's supply problem was the commissioning of Hex River power station. Despite this increase in generating capacity, however, coupled with others amounting to 104 MW *in toto*, the demand for power still exceeded the capacity to meet it. On the other hand, if the present progress is maintained, next year will see a considerable increase in generating capacity which will go some way towards easing the present position.

Sales of energy, however, again created yet another record, the 1952 figure of 8,080·5 million units sold being an increase of 8·37% over that for the previous year. In outline such is the position of the Electricity Supply Commission of South Africa as taken from their 30th Annual Report for the calendar year 1952 and review of activities up to the end of April 1953.

Visits Abroad

As in 1951, last year again saw officials of the Commission travelling abroad to try to expedite delivery of plant on order. In May 1952 a party of five visited the U.S.A. and were successful in obtaining a loan of 19,600,000 dollars, to finance the cost of providing power for the production of uranium. On its return, the party visited this country to interview manufacturers of power plant.

As mentioned earlier, the Commission's power stations increased their aggregate installed capacity by 104 MW to 1,698·5 MW, at the end of 1952. Apart from the commissioning of plant at Hex River—40 MW and two 200 klb/hr boilers by the end of the year, the remaining 20 MW set and two boilers, completing the initial stage, by April 1953—other items of plant completed during 1952 included two 190 klb/hr boilers and two 33 MW sets at Vaal station. A description of Hex River power station was given in the ELECTRICAL TIMES of 23rd October, 1952.

Construction work during the year was assisted by shortages of steel less acute than in the past. Delays in deliveries of plant and equipment were also less severe. Both factors contributed to a rate of progress better than at any other time since the start of the Commission's post-war expansion programme. The work is stated to involve capital expenditure estimated at £91,000,000. Allowance has been made in this figure for further extensions to the Salt River No. 2, Taaibos and Vierfontein stations (foreshadowed in last year's report) and for increase of £13,215,00 on estimates of expenditure.

Individual Stations

Reviewing power stations individually, at Salt River No. 2, adjoining the existing Salt River station, the design allows for eight 260 klb/hr boilers and six 30 MW sets. By April 1953 orders for four sets and six boilers, total cost £10,350,000, had been placed. Initially, the installation will consist of four boilers and two sets; the first boiler is hoped to be steaming by June of next year to relieve steam shortage at No. 1 Station.

In the South-East, a new station, West Bank No. 2 at East London, is being constructed, having an ultimate capacity of 90 MW. Two boilers of 170 klb/hr rating and two 15 MW sets have so far been ordered. At nearby Port Elizabeth's Swartkops station, plant initially will comprise two 210 klb/hr boilers with the same number of 20 MW sets, the first of which should be in operation early next year.

Disappointment at Congella

Progress on boiler extensions at Congella, Durban, has been disappointing, but one of three new 200 klb/hr units was brought into service in April of this year. Included in the programme for this station is the installation of a third 40 MW set. On the other hand, at the second Durban station, Umgeni, good progress is reported. By the end of the year erection of steelwork for boiler and turbine houses was nearly completed, whilst work on the first two boilers reached an advanced stage. The first set should be on load in April and the second in October of next year.

To provide additional power for the Rand System, Taaibos station, Coalbrook, O.F.S., is now being built adjacent to the Clydesdale Colliery. The key-point of a 132 kV system, this station will be interconnected with Vaal and Vierfontein. Whilst orders have been

placed for seven 580 klb/hr boilers and the same number of 60 MW sets, the first of which, it is hoped, will be operating in the second half of next year, work began on the erection of steelwork for the boiler house in December 1952. Extensions planned at Vaal, O.F.S., consist of eight 190 klb/hr boilers, four 33 MW turbo-alternators and a 7 MW house set to make a total of 18 boilers, nine alternators and three house sets. At the end of April nine alternators, two house sets and fourteen boilers were in service, the remainder to be completed by the end of this year if expectations are realised.

In the O.F.S.

Elsewhere in the Orange Free State, good progress is reported at Vierfontein, where the turbine house steelwork for the first five sets, and erection of the first six boilers and two of the cooling towers is advancing. To assist in meeting the demand for power developing on O.F.S. goldfields and at Klerksdorp, this station will eventually comprise seventeen 210 klb/hr boilers and ten 30 MW turbo-alternators. At Wilge, near Kendal, where the project is in two sections, the initial installation of two 150 klb/hr boilers of the spreader stoker type and one 30 MW set in the first section is expected to be operating early next year.

From the financial aspect, last year's operations showed a loss of £418,282. Although total revenue increased by 15·52% to over £12½ million, production costs rose by 17·75% to £13 million odd. Heavy increases in the cost of coal and its transport, amounting in aggregate to 30%, figure largely in these high production costs. Average price/unit sold was 0·3738d., an increase of 6·62% over 1951, whilst average revenue/unit sold, which includes sundry revenue, amounted to 0·3759d. Cost/unit sold averaged 0·3883d., 8·66% greater than in the previous year. All undertakings barring that of Sabie incurred deficits for the year.

Summarising, the 19 stations controlled by the Commission at the end of the year housed 227 boilers aggregating 17,715 klb/hr in evaporative capacity. Main generators totalled 1,574·3 MW in capacity distributed among 99 sets, whilst the 8 house sets had a total capacity of 50·3 MW. The Commission has on order 67 boilers of a total c.m.r. of 16,190 klb/hr and 38 generators whose total rating amounts to 1,266 MW.

1953 Illuminations the Best Ever

THERE is a friendly argument taking place at the moment as to which holiday resort was the first to go in for illuminations as an added attraction to holidaymakers. Whatever the result of the controversy there can be little doubt that this year's displays are bigger and better than at any previous time. The amount of money, number of lamps and quantities of cable used are really phenomenal but all are agreed that it is a very profitable venture.

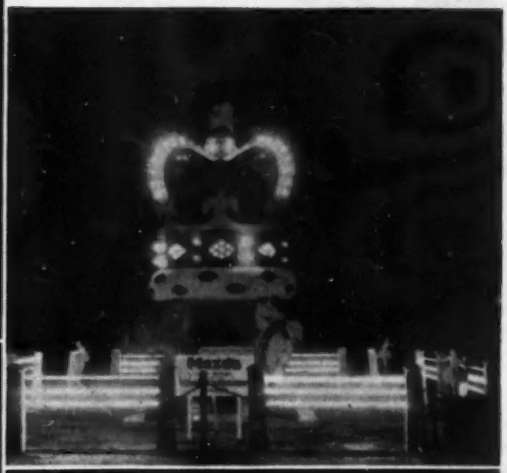
Blackpool's lights in 1953 have cost £70,000 and the equipment valued at about £400,000 is expected to be seen by some three million people. Besides the numerous streams of lights, Blackpool claims to have one of the largest tableaux built in this country. It is 650 ft long and depicts English village life on fete-day, staging a circus in action and a procession. This is on the Cliffs. Morecambe's show has been valued at £100,000 and this year's has cost £30,000. Floodlighting is a special feature there and brilliantly illuminates Happy Mount Park as well as 3½ miles of the promenade.

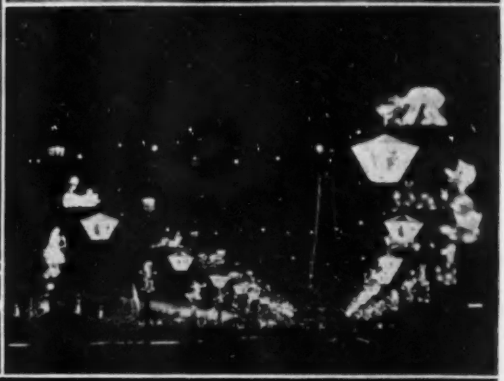
At Southend there is the best show since the war involving some 95,000 lamps and 35 miles of cable. The pier is of course the centre of attraction and displays there include such items as space ships, a neon country scene, flying saucers, floral cascade and the Test Match. Further up the coast at Skegness there is equal pride in the brilliantly lighted clock tower, the pier and their *pièce de résistance*, the Tower Gardens scheme. Neon strip lighting is a feature at Brighton, while some excellent effects have been achieved by floodlights in trees and fairylights among branches.

All resorts are now aware that illuminations are expected of them and it would take far too long to list them all, between Margate and Southport, and Torquay and Scarborough, and even then one would not cover them all because there are numerous displays of equal brilliance inland.

A quick tour of England's coastline in September: The Clock Tower at Skegness (top left); B.T.H. Co.'s display at the Royal Tournament now to be seen among Morecambe's illuminations (top right); Blackpool's famous tower and another part of the display (centre), and finally (bottom) a view of Southend pier.

The Illuminations





Acknowledgements to Baron-Hartley, Blackpool, for Blackpool photographs

overseas news

Winnipeg's Problems

The possibility of a major reconstruction of the Winnipeg City Hydro's Pointe du Bois generating plant on the Winnipeg River, is now being actively considered. Mr. H. L. Briggs, general manager of City Hydro, has said that the improvement programme for the station had been studied and had reached the point where estimates were being obtained on how much the project would cost. Mr. Briggs said that it was undecided yet whether the renovation programme would involve chiefly rebuilding equipment or replacing it. In the 1952 Report it was noted that "much of the construction and the equipment of the early years has come or is coming to the end of its useful life," it being added that "very soon the reconstruction of the Pointe du Bois plant will require costly attention." The Pointe du Bois plant is on the Winnipeg River, 77 miles northeast of Winnipeg. It was completed in 1911 and has an installed capacity of 105,000 h.p.

Station Overwhelmed

The Whatshan power plant of the British Columbia Power Commission was practically buried under a landslide a few days ago. A million tons of mud, rock and debris rolled down the mountainside engulfing the switching yards and generator plant. Walls were crumpled, equipment was carried into lower Arrow Lakes, and one of the plant's two generators was buried in rubble. Fortunately, the tunnel mouth and penstock were practically undamaged. The Commission has engaged H. G. Ayers and Co., hydraulic engineers, to carry out a thorough investigation of the site.

Expansion in Quebec

The Quebec Power Co. has now established a system planning section to take care of long range planning for future needs, President J. A. Fuller reports. The total output of electricity on the company's system during the first half of this year was 9·3% greater than during the same period in 1952 and reached a total of over 337,600,000 kWh. Because of the rapidly growing load in the general Valcartier area, a new 60 kV line, 14 miles long is being built from Quebec to Valcartier at a cost of approximately $250,000. The line is expected to be in operation about the end of the year.

H.E. Scheme for Basutoland?

The upper waters of the Orange River in Basutoland are likely to be utilised in a water conservation and hydro-electric scheme. This was stated by Sir John Le Rougetel, the U.K. High Commissioner, at the opening of the Natal Agricultural Union Congress at Pietermaritzburg. It was hoped, he said, to dam the Orange and Senqunyane Rivers at Seforong where a basalt reef crossed the gorge 500 ft deep. This would establish a reservoir 90 miles long, and at the main dam and smaller dams farther down the Orange River a total of 150 MW could be generated.

H.Q. for Uganda Board

A design submitted by a Johannesburg architect has been selected for the new 5 storey headquarters offices of the Uganda Electricity Board in Kampala. Cost of the building is estimated at about £350,000. The building, which is to be shared with the Lint Marketing Board and the Uganda Development Corporation will include, apart from extensive office accommodation, an auction room and a restaurant.

Bombay's Opposition

Further indication that the proposed Trombay steam power station, for Bombay, is likely to be of 100 MW capacity, was given at the recent meeting of the Tata Hydro Electric Power Supply Co. (who will get the licence to construct the station) when resolutions increasing the company's capital were passed. Mr. J. R. D. Tata, chairman, said that all parties concerned, apart from the Government of Bombay were fully convinced of the necessity for having two 50 MW units installed. There would also be a substantial saving if both units were constructed simultaneously. The Bombay Municipal Corporation have already objected to certain clauses of the draft licence to be granted to Tatas. The Corporation maintains that clause 5 of the licence grants Tatas a virtual monopoly of supply to consumers taking more than 500,000 units per annum. It has since been revealed that Trombay may have two 62·5 MW hydrogen-cooled turbo-alternators.

South Australia's Hopes

About £3 million will be spent on extending electricity and water services to country areas in South Australia this financial year, the Premier, Mr. Playford, has announced. Electrical projects in the country will include £51,000 for the installation of three diesel-alternator sets at Port Lincoln, the completion of powerhouse building for the diesel section of the station and other equipment there. This amount will also provide for some preliminary work on the steam station. The Electricity Trust of South Australia is now calling for tenders for two 2,500 kW turbo-alternators. It will also shortly call for tenders to supply and erect two boilers in the Port Lincoln

powerhouse. It is estimated about £1 million will also be expended during the year on the country transmission and distribution systems.

Sydney's Report

A surplus of £41,125 resulted from operations of the Sydney County Council, Australia, in its first year as purely a distribution organisation. This information is contained in the annual report for 1952, just received. We have already recorded that on January 1, 1952, the Electricity Commission of New South Wales took over the generation and bulk supply of electricity in the areas previously supplied by the Sydney C.C. Maybe the latter was not altogether sorry to be relieved of the headaches which have been associated with power generation in New South Wales in recent years. At any rate, the County Council is now confining its activities to supplying an area of 156 square miles, taking a bulk supply from the Commission, and at December 31 last there were 315,416 consumers on the Council's books—5,136 more than a year previously. Unit sales reached a total of 1,139·9 millions, an increase of 1·24%. Of that total 475·9 million units were taken by residential consumers and 517·5 millions by industrial concerns. An increase in the domestic tariff which operated from January 1, 1952, together with rises in other tariffs from the previous October, resulted in the overall average price received per unit sold rising to 2·811d. for last year compared with 2·125d. in 1951. For comparison the average cost per unit purchased was 1·617d. last year.

Views in Tasmania

When Tasmania's Parliament resumes its sittings next week the question of future electricity supplies, and particularly the matter of a thermal power station, is likely to be discussed at some length, it seems. In recent weeks, certain Opposition members have been advocating the establishment of a steam power station burning local coal, as we have already reported, but the Acting Minister for the Hydro-Electric Commission, Mr. Hand, still considers that this would be a retrograde step. Commenting on a decision of the State council of the Liberal Party to set up a committee to investigate the power position in Tasmania, he said there was no justification to consider the development of thermal power stations in Tasmania. He claimed that the cost of power supplied from the coal-burning stations of South Australia was about five times greater than the cost of hydro-electric power in Tasmania.

Power Criticisms

During the debate on the Imprest Supply Bill in the New Zealand House of Representatives a few days ago, members of the Opposition, after criticising the increased charges for bulk power supply, also suggested that progress on construction of the Roxburgh hydro-electric scheme had not been as good as was hoped. Mr. W. S. Goosman, Minister in charge of the State Hydro Electric Department, agreed that he had not been satisfied with the progress being made when he visited the Roxburgh scheme, but he had had conferences with the contractors, and they were taking steps to rectify the position. They had not been making mistakes, but they needed more key personnel. He did not know whether the Clutha River would be diverted this year. Much depended on the season. But other work could go ahead, including the installation of one of the turbines, before the diversion. Power would be produced from Roxburgh in 1955, which was the target date, the Minister said. He was not able to say whether Roxburgh would be erected at cheaper cost under contract, but his department was represented to see that there was no waste.

N.Z. Statistics

A total of 2,732·8 million units were sold by all supply authorities in New Zealand during the year ended March 31, 1952, according to the annual statistics of the State Hydro Electric Board just to hand. The 599,501 consumers thus took an average of 4,559 units in the twelve months, at a cost of 0·869d. p.u., but consumption per head of population amounted to 1,377, an increase of 110 for the year. Hydro-electric plants generated 3,039·6 million units at an average cost of 0·0258d., while the fuel stations provided 172·1 million units at an average cost of 1·288d. p.u. Installed capacity of the former at March 31, 1952, was 623,887 kW, and of the steam plants, 57,762 kW.

Small H.E. Scheme

Plans for a £100,000 hydro-electric project for the Oparara River, in the Karamea district, have been received by the Buller Electric Power Board, New Zealand. The plans, covering the erection of a long length of race, power house and distribution network to about 500 consumers, were received from the Board's consulting engineers, Messrs. Vickerman and Lancaster. Many people in the district have agreed to guarantee £40 each, and the larger consumers are prepared to guarantee £50 each, it has been stated. The engineer's estimate initial charges of £8,250 and a revenue of £7,800.

Korean Power Plans

Approval of the U.N. Korean Reconstruction Agency's 130,000,000 dollar programme of rehabilitation for Korea by the advisory committee comprising Canada, India, the U.K., United States and Uruguay is reported from New York.

The 1954 programme provides 70 million dollars more than last year and *inter alia* allots 17½ million dollars for "the development and production of power facilities." A major project would be the expansion of the Samchok thermal power plant.

PERSONALITIES

IN THE INDUSTRY

Mr. J. A. Fraser has been appointed general sales manager of the group of companies controlled by Southern Areas Electric Corporation, Ltd. Mr. Fraser has had 30 years experience in the electrical industry and until recently was general sales manager of the Domestic Appliance Division of the English Electric Co., Ltd. He has served as chairman to the B. E. A. M. A. Cooker Committee and been an executive member of a number of committees of that Association.

Mr. J. A. Fraser

Mr. C. H. Bacon, a director of Sangamo Weston, Ltd., has been appointed managing director of the company in place of **Mr. S. B. Rogers,** who continues, however, as chairman.

Previously first assistant district commercial engineer in the Stafford district of the Midlands Electricity Board, **Mr. J. T. Wordley,** A.M.I.E.E., has been promoted to district commercial engineer there. He succeeds **Mr. C. H. Pettifer,** A.M.I.E.E., who is now district engineer for Stafford.

Mr. R. F. Galloway, who commenced with W. T. Henley's Telegraph Works Co., Ltd., in 1926 as manager of their branch at Brisbane, Australia, has retired, having held that position throughout his service with the company. He is succeeded by **Mr. E. M. Dawes,** who commenced his service with the company in November 1948, and served at their works and head office until June 1949, when he sailed for Australia, taking up an appointment as sales engineer at Henley's Melbourne branch in July 1949. He was transferred to the Brisbane branch in March 1952.

Mr. S. W. Richards, manager of the Mines Department of the General Electric Co., Ltd. since its formation, has retired. He joined the G.E.C. in 1931 on the company's acquisition of the Sterling Telephone Co., Ltd., of which he was then mining sales manager, and he was given the task of forming a department to deal with the special electrical problems of the mining industry. Mr. Richards started his career with the British Westinghouse Co. at Trafford Park, Manchester, and gained experience in various collieries in South Wales first as electrical and mechanical engineer, then as underground official, surveyor and manager. He also studied the science of mining in Germany and Silesia. He holds the silver and bronze medals of the National Association of Colliery Managers and is a Past National President of the Association of Mining Electrical and Mechanical Engineers, having held office in 1949.

Mr. H. E. Barber, B.E., A.M.Inst.C.E., has been appointed New Zealand Ministry of Works' project engineer for the Waikato hydro-electric development schemes, it has been announced in Wellington, N.Z. An engineer with 25 years' experience in the State Hydro-Electric Department, Mr. Barber succeeds **Mr. A. E. Clark,** who has now taken up a new post as chief hydro-electric construction engineer at the Ministry's head office in Wellington, N.Z. For five years Mr. Barber was associated with the construction of New Zealand's South Island main trunk railway. His experience on hydro-electric schemes began at Lake Tekapo, in the South Island, in 1942. A year later, he was appointed acting mechanical engineer at Karapiro and remained there until after the work was finished. Transferred to Mangakino in 1948, he became engineer in charge of construction at Whakamaru hydro-electric power station.

Since vesting day, no less than 34 members of the chief engineer's H.Q. staff of the London Electricity Board have celebrated their 25th or 35th anniversaries of joining the supply industry. In addition, some members still on the staff passed those milestones even earlier. At a recent ceremony, Mr. D. B. Irving, chief engineer, presented awards to long-serving members of the staff. Doyen of them all was **Mr. C. H. Heard,** who joined the County of London and Brush Provincial Electric Lighting Co. in 1902, who is shown in our accompanying photograph receiving a clock to mark his achievement of 50 years' service.

Mr. Heard, right, receives the timepiece

Among the changes in the Government announced last Friday was the appointment of **Mr. Heathcoat-Amory,** formerly Minister of Pensions, to a new post, that of Minister of State at the Board of Trade. **Lord Woolton,** while remaining Chancellor of the Duchy of Lancaster, will also take over what remains of the work of the Ministry of Materials. **Lord Leathers,** secretary of State for the Co-ordination of Transport, Fuel and Power, has resigned from that position.

It is reported that **Group-Captain E. C. Lewis** has now been appointed to the board of Hick Hargreaves and Co. Ltd. of Bolton.

We are informed that **Mr. Frank Spicer** has been appointed general manager of Rushtons (Leeds) Ltd.

Miss Lesley Scott Adie, a director of Rowlands Electrical Accessories Ltd., and eldest daughter of that firm's governing director, was married on Friday last at St. Alphege Church, Solihull, to Mr. Peter G. Ordish. We offer our congratulations to the happy couple. It is understood that Miss Scott Adie has recently indicated her intention of resigning from the board, but will continue to act in an advisory capacity in the company's Plinth Lighting Public Relations bureau.

Brook Motors Ltd. announce that **Mr. Arthur D. Bailey** has been appointed manager of the Newcastle branch of the company.

Mr. B. S. Lawrence has joined E. K. Cole Ltd. as the company's press officer. He was formerly assistant editor of *The British Trade Journal and Export World.*

Mr. Thomas A. Holme, M.B.E., who was closely associated with the development and production of fabricated (welded steel) structures in the electrical industry for the past 25 years, has retired from service with the British Thomson-Houston Co., Ltd., at the age of 72. He had been with the company since 1919, and from 1940 to June 1949 he was head of the firm's new fabrication factory. Latterly he had served the company as a consultant. To mark his retirement Mr. Holme was presented with a well-filled wallet by **Mr. H. L. Satchell,** M.B.E., a director, and manager of the Rugby works, on behalf of the superintendents and heads of the various departments at Rugby. A second presentation—a gardener's pressure spray—was made by **Mr. E. T. Muston,** superintendent of the fabrication factory, on behalf of the factory supervisory staff.

Mr. T. A. Holme

Mr. J. A. Robbins, B.SC., A.M.I.E.E., A.M.I.Mech.E., who is well known in the industry for his work on earth leakage problems and high rupturing capacity miniature circuit-breakers, has been appointed technical sales manager of Chilton Electric Products Ltd.

Mr. J. A. Robbins

After completing 54 years' service, **Mr. P. H. Nye,** manager of the Business Development Department of the General Electric Co., Ltd., is retiring at the end of this month. He started in the company's Estimating Department, and after two years at the Union Street works, at Southwark, became assistant manager of the then Arc Lamp and Carbon Department at Queen Victoria Street. Later, in 1906, he was sent to manage the Electrical Department of the then newly appointed G.E.C. agents in Hong Kong. He returned to England in 1910 and a year later became managing director of the G.E.C. of China Ltd., formed that year. On his return to China in 1911, Mr. Nye took with him a number of G.E.C. staff and opened the head office of the newly formed company in Shanghai, with branches in Hong Kong, Tientsin, Hankow and Manchuria. It was in 1930 that he returned to Britain to take up the position from which he is now retiring.

OBITUARY

Mr. R. P. Giles, technical sales representative in the Midland, Eastern and South Eastern areas to W. Lucy and Co., Ltd., died on August 31, aged 50. A native of Belvedere, he was apprenticed at Fraser and Chalmers Engineering Works, afterwards going into the drawing office of Callender's Cable and Construction Co., Ltd. Seven years later he joined the sales engineering side of Siemens Brothers and Co., Ltd., and was subsequently with British Insulated Cables, Ltd. before going to W. Lucy and Co. in 1947.

Mr. R. C. Walker, B.SC., A.M.I.E.E., A.M.I.Mech.E., who was in charge of technical and commercial development of photocells, Geiger Muller counter tubes and special electronic devices in the General Electric Co's Osram Valve and Electronics Department, died on August 7, aged 57. He was also author of a number of works on electronics and its application to industry.

Wills.—**Mr. T. W. Merry,** formerly resident station engineer to St. Pancras Borough Council Electricity Department, left £2,373 gross (£2,306 net value).

Mr. C. W. Sully, formerly director of the Electric Lamp Manufacturers' Association, left £2,175 gross (£2,073 net value).

Mr. R. A. Deans, manager of the Special Lamp Department of the British Thomson-Houston Co., left £6,432 gross (£4,900 net value).

Discharges in Polythene

E.R.A. work throws light on mechanism of discharge in voids

FURTHER light has been thrown on the mechanism of discharges in voids trapped in solid dielectrics as a result of recent E.R.A. work in this field. The purpose of these experiments, an account of which is given in Report L/T271, "Discharges in Dielectrics at High Voltages and in the presence of Harmonics," by J. H. Mason, was to determine why the discharge sequence in voids enclosed in polythene differs from that predicted by Austen and Whitehead.

Austen and Whitehead's theory of discharge sequence in voids in dielectrics assumes that after a discharge in the void, residual charges are trapped on its surfaces. Hence when the applied field is reversed the succeeding discharges take place at a lower value of applied voltage. In certain cases the discharge sequence appears to differ from this theory and at applied voltages exceeding twice the inception value discharges begin much later in the quadrant of decreasing voltage than predicted.

Discharges Investigated

Discharges in polythene were investigated to account for the seeming inconsistencies, using a high voltage Schering bridge discharge detector and an applied voltage alternating at 50 c/s. The effect of harmonics was investigated by superimposing a 500 c/s voltage on the 50 c/s fundamental whilst the use of electrophotography enabled discharge figures themselves to be recorded.

Results show that the discharge sequence in voids in polythene differs substantially from that in the model circuit. At an applied voltage of 2 V_i (twice the inception voltage), no discharges occur in the quadrants of falling voltage, whilst at 3 V_i and 4 V_i discharges occur at much lower voltages in the quadrant than predicted.

In discussing these results, the explanation that these differences are a result of charge leakage are discounted. It had been suggested that the transferred charges accumulate not at the dielectric surfaces of the void but at the gas-dielectric boundaries. As the applied potential decreased these charges were then supposed to leak back into the gap, where they were neutralised. Results of experiments using a unidirectional applied voltage and with an harmonic superimposed on the 50 c/s fundamental show this explanation to be without basis.

Conclusion

The conclusion attained is that a modification of Austen and Whitehead's theory offers the most likely explanation of the discharge sequence. Two factors are held to affect the theory, the superposition of charges at adjacent sites, coupled with an initial discharge in the void at a lower stress than any subsequent forward or reverse discharge.

In the former case second discharges at any one site cannot follow unless the applied voltage exceeds 2 V_i by an amount sufficient to compensate for the superposed charge. The second factor, that the first discharge takes place at slightly lower stress (probably occurring at a minute surface imperfection destroyed by the discharge) than any subsequent discharge explains why reverse discharges do not occur, as predicted, in the quadrant of falling voltage, and is supported indirectly by evidence gathered in the experiments.

Further Work

A second progress report on the effect of arcing on the mass-flow of air through the nozzle and on nozzle pressure in gas-blast circuit breakers is contained in E.R.A. Report G/T262 by A. A. Hudson, B.Sc., Wh.Sc. A continuation of the work described in Reports G/T234 and G/T255, experiments were conducted at a higher value of chamber pressure —115 lb/sq in. gauge as against 80 lb/sq in. gauge in earlier work. For this value of pressure, the mass flow of air was found to be again a function of $I/d^{1.5}$, where I is arcing current and d is nozzle diameter.

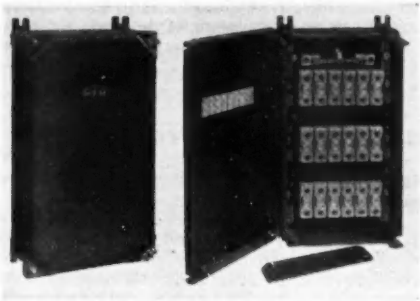
Two further reports, M/T116 by S. F. Pearce and D. C. G. Smith and M/T117 by J. Miedzinski and S. F. Pearce describe equipment recently developed for the Admiralty for the measurement of radio interference in the range from 0·15 to 30 Mc/s, whilst work on the dielectric properties of silicone liquids at higher frequencies and temperatures than those concerned in Report L/T201 is described in L/T247 by E. Rushton.

The BUYER'S *Column*

Kantark-Major Fuseboards

THE new range of "Kantark-Major" fuseboards announced by MIDLAND ELECTRIC MANUFACTURING CO., LTD., Redding's Lane, Tyseley, Birmingham 11, is of sheet steel with steel end-plates and covers. The cases are in black and covers in black wrinkle stove enamel.

These fuseboards are designed for use on 500 V supplies. S.p.n patterns are available in 15 and 30 amp ratings, whilst tp and n types can be supplied for 15, 30 and 60 amp ratings. All boards except the 60 amp size are made up in 12 ways.



The triple pole and neutral "Major" board

A feature of interest on the triple pole boards is the provision of two mounts on the top fusebank to which may be attached a neutral bar for conversion to triple pole and neutral patterns.

In comparison with the style of the company's present pattern, the cases of the new models are deeper, providing more wiring space.

Insect-Free Lighting

LAMPS which do not attract flying insects are the latest introduction by CROMPTON PARKINSON, LTD., Crompton House, Aldwych, W.C.2.

These new "Buzz Away" lamps provide a pleasant primrose yellow light which, whilst suitable and pleasant for use indoors and outdoors, offers no attraction at all to the insect world.

The light from a normal lamp is a combination of many of the colours of the visible spectrum. Violet light has the greatest attraction for insect life and the other colours in the spectrum have, apparently, a lesser attraction until in the yellows a point is reached where there is no attraction.

This new Crompton lamp emits only that colour, all other colours being suppressed. It has a glass finish coating resistant to atmospheric corrosion, and it provides adequate light for general purposes. It is available in 60 W and 100 W ratings for 220 and 240 V. Prices, 60 W, 1s. 9d., plus tax (18⅓%), and 100 W, 2s. 6d., plus tax.

New Wolf Die-Grinder Kit

LATEST die-grinder tool (DG1) introduced by WOLF ELECTRIC TOOLS LTD., Hanger Lane, Ealing, W.5, incorporates a powerful motor rated at 270 W with running speed (light) of 16,000 r.p.m. Weighing 5 lb, this tool has a capacity for grinding wheels up to 1¼ in. dia. by $\frac{1}{16}$ in.

The complete kit comprises the DG1 grinder, a carefully chosen set of mounted points, grinding wheels, and felt bobs and arbors, completely housed in a special steel carrying case.

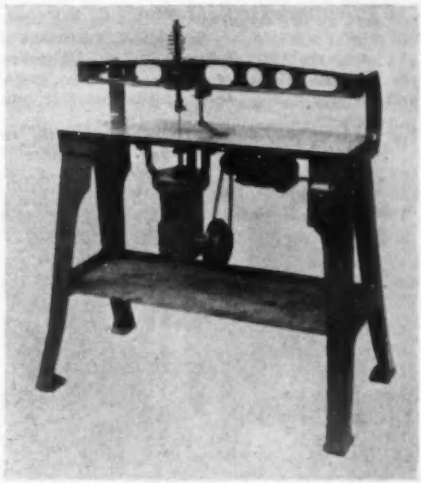
Hillman Make Saw-Bench

DEPARTURE from their usual production work is marked by the introduction of a new universal saw bench by HILLMAN ELECTRIC MOTORS LTD., 2-3 Northwold Road, N.16.

It is an all-purpose saw which will deal with these following materials at top speed and efficiency. They are mild steel, lead coated steel, galvanised iron, stainless and cast steel, cast iron, copper, brass, bronze, plastics and synthetic materials, hardwoods, etc.

Although it is robustly constructed, the "all-purpose saw" is capable of producing very delicate work and will make fine and intricate cuts. The saw holders swivel for fixing in any position and take blades up to ¼ in. in width. They will also hold flat and round shank files.

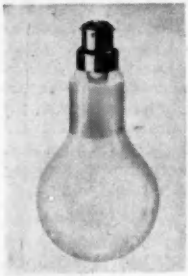
Dimensions of the table are 3 ft 3 in. by 10½ in. Distance from bridge to table 5½ in., cutting height 1½ in., swing round saw blade 16½ in. and 23½ in. respectively. Saw blades are 5 in. or 6 in. in length.



A new venture by Hillman Electric Motors

Mazda and Osram Lamp Improvements

IN the latest Mazda Type MBF/V mercury discharge lamp the colour distortion which has always been associated with high-pressure mercury lamps (the tubular fluorescent lamp is a type of low-pressure mercury lamp) has been eliminated, say BRITISH THOMSON-HOUSTON CO., LTD., Crown House, Aldwych, W.C.2. This colour distortion has always been particularly evident when viewing the human complexion, many foodstuffs and objects of a red or reddish hue.



Appearance of the improved M.V. lamp

This important improvement is due to the use of a new type of phosphor coating on the inside of the bulb of the lamp which is a very efficient emitter of red light when subjected to ultra-violet radiation. This red light blends with the blue-green radiation from the mercury vapour in the arc tube to produce a light which not only approximates to a white light in appearance, but renders objects in a far more natural colour than any previous lamp of its kind.

The new phosphors also allow of the use of a smaller bulb size in each wattage. The 80-watt lamp has a three-pin cap, the 125-watt has a G.E.S. (screw) cap but is also obtainable with a three-pin cap.

Similarly the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2, have introduced an improved colour corrected Osram mercury fluorescent lamp. The company give a figure of 7% increase red ratio and point out that improved temperature stability has enabled them to reduce the glass bulb to the same size as standard Osram mercury lamps of the same wattages.

They quote prices of these lamps as before, at £2 8s. 6d. for the 80 W and £2 19s. for the 125 W size.

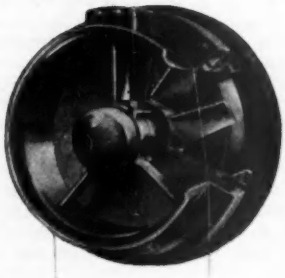
New "Camera" Fan Shuts Out the Draught

DESPITE the undeniable popularity of the window fan as an aid to office or factory ventilation, its use had an accompanying drawback. Unless the aperture were blocked during periods when the fan was not in use, unwanted draughts resulted—particularly discomforting during winter months.

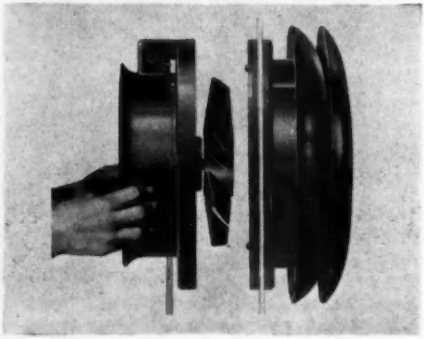
This objection has been overcome in a new "Xpelair" fan, introduced last week by the G.E.C., by the use of an iris shutter, on the principle of a camera aperture. Fitted immediately before the fan blades themselves, the shutter completely closes the aperture when the fan is not in use.

Linked with an inbuilt fan switch, the shutter is actuated by two nylon cords. Pulling one opens the shutter and switches on the fan. To switch off and close the shutter the other cord is pulled. Made of plastic, in common with the fan casing and exterior baffle, the shutter is therefore non-corroding; and as during operation it is recessed in the casing, it cannot rattle or collect dust.

Provision has also been made in this new fan for easy cleaning of the fan unit. This part may be detached by removing four screws, leaving the centre portion and outlet baffle still attached to the glass. Fitting the fan involves cutting only one circular hole, the standard fixing screws allowing for partitions up to 1 in. thick. A further useful feature of the fan is that without the exterior baffle, the unit projects only 1½ in. from the window. On the Continent particularly, where window shutters still find considerable use, such exterior dimensions are necessary requirements for installation.



Two views of the fan, that below showing the removal of the fan unit for maintenance



Two sizes of fans are being manufactured, having extraction capacities of 15,000 and 30,000 cu ft/hr respectively. For closer control of the rate of air extraction a remote control speed regulator can also be supplied. Having exterior dimensions of 4½ in. by 2⅞ in. by 2¼ in., this unit gives four fan speeds and an off position, with a warning lamp in the knob to show when the fan is operating. The fan motor is totally enclosed and fitted with silent-running S.A.S.O. sleeve bearings. For the smaller capacity model the list price is 15 gns, and the other size £19, whilst the regulator, for either size, is £2 9s. extra.

Ontario Hydro in 1952

Increasing expansion in generating capacity and load

DETAILS have now been issued of the progress of Ontario Hydro during the year 1952, during which the benefits of the intensive programme of development and expansion undertaken in the immediate post-war period are well apparent.

During the year, 64 hydraulic and 8 fuel-electric stations, owned or operated by the Ontario Hydro-Electric Commission contributed 15,272 million units out of the total of 19,974 million units produced for the commercial load. The net output of all resources exceeded the previous record by 6·2%. Since 1945 when the expansion programme was launched, the energy generated has increased by 79·3% while that bought has increased by only 16·6%.

New Plant

The placing in service of seven of the eight units at Otto Holden and the installation of two additional units at the Richard L. Hearn plant, and one at J. Clark Keith, together with minor revisions in the capacity of several other plants already in full service advanced the dependable capacity from 2,942 MW in 1951 to 3,353 MW at the end of 1952, an increase of some 14%.

The fuel-electric stations played an increasingly important part in the year's operations, the net amount of energy produced for commercial load purposes having increased nearly four times, from 104 million units in 1951 to 414 million in 1952. At the same time the service area of the Commission was extended by the inclusion in the system of several rural communities, including Longlac, Britt, Whitney, Cochrane, Webbwood, Massey and the residents of Thorah Island in Lake Simcoe. Supply for the latter was accomplished by the laying of about two miles of submarine cable.

Continuity of service in the Southern Ontario System was maintained at a relatively high level during the year. There was, however, a major disturbance on October 1st when there was a severe electrical storm which tripped out four of the generating sets at Des Joachims, two transformers, two frequency changers and disconnected the 230 kV tie line from Des Joachims to Otto Holden. The repercussions were felt all over the system and a total loss of generating capacity of 350 MW took place. Most supplies were however restored in 38 minutes, and, due to some delay in bringing the steam turbo-alternator plant back into operation, the whole system was normal in 48 minutes.

Financial

Capital expenditure in 1952 amounted to $163 million of which approximately 60% was spent on generation. The gross investment in fixed assets amounted to $1,177 million at the end of 1952 against which there was accumulated depreciation of $137 million.

Cost of frequency standardisation works amounted to $37 million and at the end of the year inventories of material and equipment for future standardisation stood at $25 million.

After all costs and provisions had been deducted the Southern System showed a deficit of $135,678 which was however met by transferring some $2,061,885 from the stabilisation of rates reserve to give an excess of $1,826,107. In the Northern Ontario Properties a deficit of $561,179 was shown in general trading and a surplus of $77,609 in municipal dealings leaving an overall deficit of $483,570.

Research

Research includes the continuation of investigation into lighting and extensive surveys were conducted to discover the thunderstorm severity in Ontario; laboratory studies of surge phenomena supplemented this work. The findings permitted a determination of the protection against surges required for 115 kV cables, an evaluation of the effectiveness of thyrite lightning arresters and the establishment of a reduced basic insulation level of 900 kV for 230 kV transformers. Work has also been carried out on the problem of television interference as a service has begun in Southern Ontario.

The suspension of plastic insulated power cables in a vertical or near vertical position was also investigated and a promising support devised consisting of a neoprene strap bound to the cable by means of p.v.c. tape. A full-scale field trial is continuing to simulate the application of the supports proposed for the Sir Adam Beck-Niagara No. 2 station.

The WEEK in NEWS

More Help for Smaller Firms?

B.o T. urged to Concentrate on aiding Little Concerns

GREATER efforts to reach the small firms to help them contribute towards Britain's export drive is one of the recommendations put forward by the Select Committee on Estimates in their report on Assistance to Exporters, published last Friday. Many small organisations which could play a large part in foreign trade would be willing to enter foreign markets if they knew where to begin, and of the facilities available to help them, it is stated. Small concerns could not afford large selling organisations nor maintenance representatives abroad, and they were so scattered and numerous that it was difficult to bring them within range of Government services. The export potential of these small firms could be enormous and consequently the Board of Trade is urged to concentrate more on their needs.

One help to the small firm would be easy access to samples of foreign goods which would be competing in overseas markets, and the department was asked to ensure that their service in this connection was adequately publicised. Another method of aiding the small manufacturer was the setting-up of collective selling groups. This had been done in more than one instance, but the onus lay with industry.

Other recommendations include an assurance of continuing Government aid for the Dollar Exports Council and of stimulating interest in industrial design. It is also hoped that the activities of the B.S.I. will expand.

ANOTHER RUSSIAN CONTRACT FOR U.K.

A CONTRACT to the value of over £3 million has been negotiated by the Brush group of companies with Russia, it was announced on Friday. It involves the supply of diesel electric generating sets, transformers and other electrical plant but will, of course, be subject to the granting of the necessary export licences. This announcement follows a visit to Moscow of Brush director Mr. Sydney Lane, who was one of a party of British businessmen who went to Peking earlier for trade talks with representatives of the Chinese Republic. It will be recalled that early last month Crompton Parkinson Ltd. secured a £500,000 cable contract from Russia.

Electricians' Strike: Deadlock Continues

AT the time of going to Press there seemed little hope of any immediate break in the deadlock arising from the E.T.U.'s claim for higher wages. Stoppages, resumed last week after the failure of negotiations, have spread, and it is now understood that some 5,000 men have downed tools. A Union offer that they would be prepared to refer the dispute to arbitration if an interim increase was granted, has been rejected by the employers. The N.F.E.A. state that this could not be considered because it would prejudice possible awards made by the Industrial Disputes Tribunal.

The strike at Earls Court just prior to the opening of the Radio Show was called off following an award of 3d. an hour extra, and it is understood a Union offer has been made to Olympia Ltd. for a similar increase in wages. These in no way affect the general strike position, however. Meanwhile, the strike is almost certain to spread to Scotland. Its expansion during last week affected a number of extensions to power stations although an approach to workers at Keadby was turned down originally. If all else fails, the Minister is bound to refer the matter to the Industrial Disputes Tribunal.

Supply Ministry and B.o.T. Offices Combine

REGIONAL offices of the Board of Trade and Ministry of Supply are to be amalgamated. The actual date on which the two departments will amalgamate will vary according to local circumstances. These new combined offices will continue o act on behalf of the Ministry f Materials.

The First Half-Century

THE Institution of Mining Engineers has been in session lately—holding its annual meeting in Nottingham. To electrical engineers the chief point of interest brought out at the meeting was the evidence of increasing use of electricity in mines. This, Mr. W. Walker assured his audience, would become an urgent necessity in the near future, for miners were becoming more and more unwilling to submit to the hard physical conditions that satisfied their fathers, and machine cutting was the only way of working some seams profitably.—*From our issue of September* 10, 1903.

Judge's Verdict on Belfast Contract

IN his reserved judgment given in the Belfast High Court last week, Mr. Justice Curran found that there had been a breach of statutory duty on the part of Belfast Corporation in approving the £2,976,496 contract with Babcock and Wilcox Ltd. for the supply of seven boilers, etc. for the West power station. But his lordship declined to make the order sought by Ald. M'Kee (to which we referred last week), and stated that the farthest the Court could go would be to require the Corporation to comply with Standing Orders. The judge said he would be prepared to adjourn the matter to enable the Corporation to consider making a specific recording of special consideration before executing the contract, or alternatively he would have to grant an order requiring compliance with Standing Orders.

It might be assumed, he went on, that the departure from the procedure of inviting tenders by advertisement was decided upon because the Electricity Committee were satisfied there was a special consideration, in that the acting city electrical engineer had recommended that course in view of the time factor. But there was absent from the various minutes any specific record that the Committee had made a decision to that effect, and he could not avoid the conclusion that there was some reason for the Committee not recording such a decision. He was not prepared to assume that the absence of such a record was due to inadvertence.

Therefore, he held, the committee were guilty of a breach of their statutory duty.

The Corporation contended their reference to special consideration appeared in the report of the acting city electrical engineer, recorded in the minutes, and that in substance the Committee agreed, but the absence of a specific record of such determination was merely a formal matter. Although the judge confessed that he was impressed by the contention, he maintained that such determination should have been made.

The case was adjourned to enable the Corporation to comply with Standing Orders, the status quo being maintained meantime.

Two Hours' Washing will cost 3s. 6d.

AN electrical shop in Scarborough has introduced a scheme to help housewives on washing day by hiring out washing machines. The idea is perfectly simple. A machine is delivered to the house, left for two hours and collected again, for which service, which includes installation, the housewife pays 3s. 6d. The appliance is then taken to another customer, and so on. The dealer maintains that no person really wants the washing machine for more than two hours a week, and during the rest of the time it merely takes up space in the kitchen. There have been a number of complaints among small local dealers that the Electricity Boards have too many trading advantages on their side, and this idea appears to be one local dealer's answer to the difficulty. The scheme is of course a special help to anyone who cannot afford hire purchase.

RADIO SERVICING EXAMINATIONS

RESULTS of this year's Radio Servicing Certificate Examination have been announced by the Radio Trades Examination Board and the City and Guilds of London Institute. A total of 309 candidates entered and of that number, 126 qualified for the award. Those passing the examination included 30 candidates who passed the practical test. This year 87 entrants were successful in the written answers, but were referred in the practical test.

The 1954 examination will take place on May 4 and 6 for the written papers and May 15 for the practical test. Closing date for entries is February 1.

Refresher Course

A COMPREHENSIVE refresher course consisting of 20 weekly lectures is being organised by the Incorp. Plant Engineers for works engineers in the West Riding. It will take place at Leeds University on Thursday evenings from October 15. This follows a number of similar successful courses held in previous years. Applications should be made to Secretary to the Courses, Dept. of Engineering, Leeds University.

Picturesque Saumarez Park was the scene of Guernsey N. Agricultural and Horticultural Society's annual show. Our photograph shows the State Electricity Dept.'s stand situated in a pleasant corner of the exhibition ground. During the two-day event the stand was visited by some 7,500 persons including H.E. The Lieutenant Governor

ALL-ELECTRIC HOUSES WOULD SAVE £2½m

A NATIONAL saving of £2,500,000 would be effected if all local authorities built all-electric housing estates, the chief commercial officer of the S.W. Scotland Electricity Board, Mr. J. Gogan, said last week. The statement was based on the present target of building 300,000 houses a year. He was speaking at the switching-on ceremony of Clydebank's Overtoun Park illuminations. Clydebank, he said, had set an admirable example. Years ago they set out to make the town all-electric. They had saved about £8 per house by doing so, which meant a saving of £40,000 on about 5,000 all-electric houses. This policy had also saved the housewife about £2 a year.

Direct Labour

DAGENHAM (Essex) Council is considering the setting-up of a direct labour force to deal with maintenance work on street lamps. It is calculated that such a move would save about £2,250 a year on work at present carried out by the Gas and Electricity Boards. Until a decision is made, the conversion of side streets from gas to electricity is being deferred, but the cost of conversion work to more modern standards by direct labour is being studied.

OFFICIAL PUBLICATIONS

BRITISH STANDARDS:
B.S. 37: Electricity Meters—Single-phase two-wire prepayment meters. B.S. 2007: Circular gear shaving-cutters—Accuracy. B.S.: 697: Electricians' Rubber Gloves (Revision). B.S. 142: Electric Protective Relays (Revision).

OVERSEAS ECONOMIC SURVEY Belgium and Luxembourg (*see page* 493). H.M.S.O. 3s. 6d.

COUNCIL OF INDUSTRIAL DESIGN. Annual report. (*See page* 464).

ASSISTANCE TO EXPORTERS. 13th Report with Proceedings of Select Committee on Estimates (*see page* 490). H.M.S.O. 5s.

IMPORT DUTIES (Exemptions) (No. 3) Order. S.I. 1343. H.M.S.O.

Intrinsically Safe and Approved Electrical Apparatus. List of Certificates by H.M. Inspector of Factories. H.M.S.O. 6d.

Electricity "At Home"

THE public is being invited to Lewisham Town Hall next Tuesday, Wednesday and Thursday by the E.A.W. and will be given the opportunity to try out the latest electrical appliances. The apparatus exhibited will cover each room of the house and out into the garden.

Lamp Efficiency

PHILIPS ELECTRICAL LTD. have asked us to point out an error in their advertisement on page 10 of our September 3 issue. The 12½% increase in efficiency mentioned applies to the company's daylight and warm white fluorescent lamps.

View of W. H. Smith's bookshop in Oxford St., where lines of light were installed to persuade customers to enter the shop

Trophy for Most Efficient Branch

EACH year the executive council of the A.S.E.E. awards a trophy to the branch which gains the highest number of marks for the best all-round record of activities. Among the items taken into consideration are attendance at meetings, percentage increase in membership and efficiency in managing branch affairs. For the 1952-53 session, the Branch Merit Cup has been awarded to Bournemouth. Last year's winners, the S. West London branch, were placed second in the competition, and Nottingham third. Presentation will be made at the first meeting of the new session on October 20.

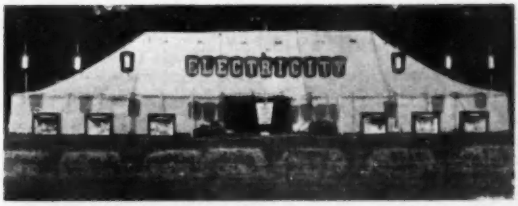
E.D.A. Film for Festival

THE E.D.A. film "Fifty Acres" has been selected for exhibition at the International Festival of the Agricultural Film at the Agricultural Exhibition in Rome next month.

An Alluring Installation

SINCE the war, W. H. Smith and Son Ltd. have been engaged in an extensive programme of modernisation among their numerous shops and bookstalls. One of the latest to be rejuvenated was their shop in Oxford St., London, which has a spacious interior, but only a limited frontage. The task of luring customers into the shop, therefore, fell mainly on the intrigues of the lighting engineer.

This job was achieved by installing lines of light, which are recessed into a false ceiling and have the effect of leading the eye from the porch into the shop itself. The actual system comprised egg-crate louvres and fluorescent lamps. The work was carried out by John Hearson and Co. Lamps and reeded "Perspex" diffuser fittings were made by Siemens Electric Lamps and Supplies Ltd. Built-in fluorescent lighting has also been used in display cases and on counters.



A general view and the cooker display at London Electricity Board's stand at last month's Ilford Horticultural Show. About 10,000 persons visited the stand and some firm orders were placed

Electrical Export Trade in Germany

IF they are not already doing so, British manufacturers of electrical goods must soon face up to the growing W. German electrical industry as a competitor in world markets. Some facts and figures of achievements in that country have reached us recently from Wiesbaden. They show that exports during the first half of this year exceeded by about 70 million DM. the value of exports in the earlier half of 1952. Exports of electrical items last year were valued at 1100 million DM. and amounted to some 18% of total production and 6·5% of W. German exports. Sweden was Germany's best customer, followed by the Benelux countries, Turkey and Italy and Switzerland, while the largest overseas purchaser was Brazil.

As to the composition of those exports, we learn that machinery and parts formed the largest proportion, whilst cables and wire was second. Payment and transfer difficulties continue to hamper trade, especially with such previously good customers as Brazil, Yugoslavia, Turkey, Egypt and Finland. Germans are quite confident that electrical exports during 1953 will at least reach last year's level even if they do not exceed it.

Exporters to Denmark facing keen Competition

NOT a great deal of help as regards prospective business will be found by electrical engineers in the recently published Overseas Economic Survey for Denmark. There is little about electricity supply or electrical engineering, either on the current position or for the future. Mention of projects envisaged is limited to the scheme for supplying Denmark with power from Norway via Sweden, but although agreement has been reached in principle, it is still at the discussion stage.

It is perhaps significant that electrical apparatus figures prominently among the lists of Denmark's exports and imports, and the latter are following an upward trend. In general, it is stated, the supply of electrical goods is not only sufficient to meet the needs of the home market, but also offers effective competition to the U.K. in the export field. Electrical engineering industries are making great efforts to step up exports, and in fact exports have increased from Kr. 9·3 million in 1949 to Kr. 13·9 million in 1950. As regards competition and exports to Denmark, the survey reminds us Germany's revival will provide increased difficulties for British exporters.

British Week in Canada

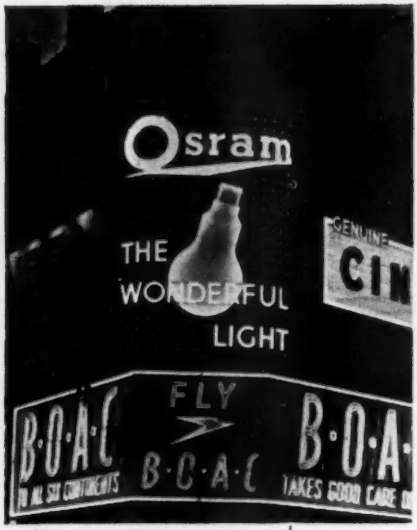
FOR the fifth year the Provinces of Manitoba and Saskatchewan are holding British Trade Weeks. Throughout this week merchants are urged to display prominently goods manufactured in the U.K. with the object of doing as much as possible to promote the sale of British goods. The appeal was by the Lieut-Governors' proclamations. The week ends on Saturday.

Electricity in Belgium and Luxemburg

THE economic survey of Belgium and Luxemburg just published gives just a few details of the electricity supply position in those countries, from which we can draw our own conclusions, but states little about the prospects of trading in electrical plant and appliances. The two countries differ to some large extent in their supply positions. Belgium appears to be in an entirely satisfactory situation. Average increase in output since 1946 has been 10% annually, which is surpassed only by the U.S. and Italy. Output in 1952 was 9,464 million kWh and at that time industrial and non-industrial consumption exceeded pre-war levels by 50% and 100%. Power stations are developing the use of unsaleable colliery by-products and refuse. As to the future, we learn that adequate investment, labour and material is available for expansion.

Several projects are being planned in Luxemburg, but most of the increase in power production will be for export, which suggests that supplies are adequate for home consumption. Plans for the future include the construction of barrages and hydro-electric plants at Rosport and Wallendorf, Isenborn and Stolzenburg. Possibilities of building barrages at Remich and Grevenmacher are also being considered.

Exports to both countries from the U.K. have increased in recent years, and the survey mentions electrical equipment as being one of the primary causes of this rise.



A novel illuminated sign has recently been erected among the Piccadilly lights. Made by Claude General Neon Lights, Ltd., the new sign advertises Osram lamps. Novelty lies in the 3-D-impression. Mounted on a background of 228 winking lamps is a 14 ft replica of an Osram lamp. This is made of plaster and is concave. Indirect lighting from the edge has been carefully positioned to give a convex relief effect

Import Duties on Iron and Steel

SUSPENSION of import duties on certain iron and steel goods, effective as from September 19, 1952, has been continued for a further six months. One new heading in respect of sheets and strip (including electrical) coated with an inorganic silicate not exceeding 0·1 mm. thickness, has been added. Excepted from the new exemption order are heat resisting alloys used for electric heating elements, cold rolled plates, sheets and strip of a width not above 18 in.; and barbed and single wire.

Keadby Power Station

IN our issue of August 27, we published a description of Keadby power station. The consulting engineers for this station were appointed by the Central Electricity Board before vesting day and are Messrs. Ewbank and Partners. The foundation works were carried out by Sir William Halcrow and Partners, and the architecture of the superstructure by Messrs. Farmer and Dark.

ANY UGLY PICTURES?

HAVE you any photographs of power stations or grid lines which spoil the beauty of the countryside? If so, the Council for the Preservation of Rural England would like to have them. The Council is to collect a dossier of such disfigurements, other subjects on its list being television and radar masts, traffic signs, lamp posts and gas works. The Council proposes to present the material under the headings: structures, dumps and disorders, and excrescences.

NEWS IN BRIEF

The G.E.C. has recently equipped a mobile showroom to introduce their ranges of instruments and switchgear.

M.R.A. Productions showed their new colour film "An Idea takes Wings" recently. It depicts events from a two-years' dispute and strikes to the development of new management-labour relations.

Next year's Scottish Industries Fair will take place at Kelvin Hall, Glasgow, between September 2 and 18.

Third meeting of the Commonwealth Advisory Aeronautical Research Council is being held in London. Previous meetings were held in Australia in 1948 and in Canada in 1950.

The 22nd Leicester and E. Midlands Home Life Exhibition opened at the Granby Halls yesterday. It closes on September 19.

United Steel Companies Ltd. have invited 34 students from 13 Universities to spend a week in Sheffield for a course on iron and steelmaking, steelworks engineering and research.

Merseyside and district area final of the E.I.B.A. National Golf Tournament was played in the Heswall course last week.

We have been asked to point out that the McLaren diesel engine mentioned on page 426 last week drives a Brush alternator.

General view of L.E.S. Distributors Ltd's new showroom in Alfred Place, W.C.1, opened last week by Elizabeth Allen of T.V. fame

Electric Supply News . . .

Douglas (I.o.M.)

Units sold by the Corporation Electricity Undertaking during the year ended March 31 last amounted to over 19 million—an increase of 5·57%. Mr. C. Anderson, borough electrical engineer and manager, records in his annual report. The number of consumers connected also rose by 387 to a total of 9,159, whose average consumption reached 2,034 units for the year. Although there was an increase in revenue of £13,180 and a reduction in operating costs of generation, distribution and management amounting to £8,023, the year's operations resulted in a deficiency, due to the loss of the Isle of Man Electricity Board's contribution to the interest and sinking fund charges on the power station plant and the rise in costs of fuel, labour and materials. The deficiency has been limited to £17,562 by the temporary suspension of a portion of sinking fund payments, and has been met out of the reserve fund. But with the reserve fund now almost exhausted, Mr. Anderson is obviously a little worried lest the anticipated increase in demand during the current year fails to be realised. During the past year a 5,000 kW turbo-generator and two 60 k lb/hr boilers were brought into full use at the Pulrose power station. But with the loss of the bulk supply to the Isle of Man Electricity Board the problem now is to profitably utilise the power station's potential. True this new plant is more efficient than the old and is affecting a proportionate reduction in running costs, but efforts to stabilise tariff will be nullified unless the wide gap between the present load and the potential of Pulrose power station is closed much more rapidly, the borough treasurer also points out in his annual report. This is the problem Mr. Anderson is now tackling, but in the circumstances it seems that there is no easy solution.

Eastern Board

In the month of June the Eastern Electricity Board connected 4,702 new consumers, including 73 farms. Mains extensions amounted to 28 miles of h.t. line and 38·1 miles of low voltage line.

Glasgow

The Corporation has received the consent of the Secretary of State for Scotland to the borrowing of £1,420,810 in respect of the conversion of Pinkston power station to 50 cycles operation and the ancillary works connected with the scheme.

Merionethshire

The B.E.A. are considering the possibility of a pump storage scheme in the Cader Idris area, Merionethshire. This was revealed at a meeting of the Merioneth Park Planning Committee last Thursday, when correspondence between the National Parks Committee and the B.E.A. was read. In this the Authority had stated that they were considering the possibility of pumping storage schemes in various parts of England and Wales, and the proposal to sink trial borings in the Cader Idris area was to ascertain whether such a scheme was practicable there. Details had not yet been worked out, but the scheme would utilise Llyn Cae as an upper reservoir and Talyllyn as a lower reservoir. At off-peak periods, when spare steam generating capacity was available, water would be pumped from the lower to the upper reservoir and at peak periods would contribute to the available generating plant by being returned from the upper to the lower reservoirs. One of the purposes of the trial borings was to determine whether it was reasonably practicable to construct an underground generating station to house the necessary pumping and generating plant. It was envisaged that it would be necessary to raise the level of Llyn Cae to increase the height of the existing natural dam, while the weir at Talyllyn would also have to be raised. These were preliminary investigations, the B.E.A. added, and even if the scheme were found practicable there was at present no certainty that it would be proceeded with in preference to other alternatives being considered elsewhere.

At the meeting some members objected to the proposal but Alderman D. M. Tudor said he was anxious to see electrification of the countryside and was not in favour of objecting. But it was decided to express concern at the proposal and to take the matter up with the Snowdonia Park Advisory Committee.

South Western Board

In the five years since vesting day, the South Western Electricity Board had connected 5,381 farms, an increase of 85% compared with about 55% in other areas in the country, Mr. G. W. Richards, deputy sub-area manager, stated last week.

LIGHTING SCHEMES

Buxton.—The B.C. is to consider a scheme for the improvement of street lighting estimated to cost £5,985. This provides for a number of roads, as a temporary measure, to be brought up to 50% only of Group B standard.

Colne (Lancs).—The Borough engineer is to prepare plans for main road lighting, Albert Road, Church Street and Market Street. Cost £2,000.

Stalybridge.—The Paths and Lighting Committee reports that M.o.T. has approved part of the scheme for conversion of street lighting in the borough from gas to electricity at a cost of £3,500.

Trowbridge.—The U.D.C. has approved for submission to the Ministry of Transport an electric street lighting scheme, involving 106 lamps at an estimated cost of £10,600.

Walthamstow.—The Council has chosen sodium lighting for three of the borough's main streets—Forest Road, Hoe Street and Chingford Road.

Company Activities . . .

Belliss and Morcom

The group profit for the year ended March 31 last amounted to £62,275, compared with £80,059 for the previous year, according to the preliminary report. This figure is struck after charging taxation of £129,007 (*£135,213*). The board states that work-in-progress has been revalued, resulting in the profit before tax being increased by £14,965 and £51,124 being added to the contingencies reserve. The final Ordinary dividend is 8½%, again making a total of 12½% for the year.

Britannia Electric Lamp Works Ltd.

The reduction in the consolidated trading profit of this concern for the year ended March 31 last is due to the more difficult trading conditions which prevailed during the period, the directors

Year to Mar.31	£ Trading Profit	£ Net Profit*	% on Ord. Earn'd	% on Ord. Paid	Ord. Price High	Ord. Price Low
1949	54,200	17,215	18	12½	10/3	10/-
1950	81,898	27,372	28	12½	10/-	9/6
1951	135,564	43,855	48	12½	10/6	10/3
1952	130,951	34,258	37	12½	10/9	10/7
1953	119,783	21,188	22	12½	10/3	10/3

*Attributable to the Parent Co.

state. In the circumstances, they consider the results satisfactory. The directors have placed a further £5,000 to general reserve and £3,000 to reserve for replacement of plant, bringing the totals of those accounts to £35,000 and £18,000 respectively.

Brush Electrical Engineering Co., Ltd.

Shareholders have approved the issue of 940,000 unclassified £1 shares as 6% Cumulative Convertible Redeemable Preference £1 shares.

George Cohen Sons & Co., Ltd.

After charging depreciation, bank overdraught, directors emoluments and audit fee, the consolidated trading profit for the year ended March 31 last is £1,740,392 compared with £1,794,667 for the previous year. Taxation absorbs £1,296,156 (*£1,111,500*). The company's turnover, at nearly £22 million, was almost 50% greater than last year's, Mr. C. M. Cohen, the chairman and managing director, states.

A. C. Cossor, Ltd.

We referred last week to the proposal to raise additional capital. In his report, Lord Burghley,

Year to Mar31	£ Trading Profit	£ Net Profit†	% on Ord. Earn'd	% on Ord. Paid	Ord. Price High	Ord. Price Low
1949	—77,671*	—216,381*	—	—	11/4	4/10
1950	247,760	93,630	23	—	12/6	7/3
1951	481,169	164,213	47	—	17/7	8/6
1952	487,977	111,465	30	10	13/8	8/-
1953	469,406	59,531	13	10	11/4	8/-

* Loss †Available for parent company.

the chairman, points out that a considerably larger amount of finance had to be provided during the course of the year just ended to handle the expanded business, with the result that the bank overdrafts during most of the year were substantially higher. He considers the prospects for the current year reasonably good.

Electric Furnace Co.

Although the past year was successful both as regards gross profit and the technical development of the company, the incidence of taxation, especially E.P.L., has reduced the larger gross profit to a smaller net profit as compared with

Year to Mar.31	£ Trading Profit	£ Net Profit	% on Ord. Earn'd	% on Ord. Paid	Ord. Price High	Ord. Price Low
1949	52,436	8,195	9	8		
1950	84,738	17,248	29	8		
1951	122,851	37,511	80	10		
1952	142,101	52,085	116	10	22/10	20/-
1953	188,453	45,621	96	12½*	23/-	22/3

*Plus 100% capital bonus.

the previous year. A Canadian company is to be formed, in association with well-known Canadian and U.S. concerns, which will supply all classes of melting and heat treatment furnaces, either imported or built in Canada, as may be advisable, Mr. D. F. Campbell, the chairman, states. Of the companies in the Efco group, the Electric Resistance Furnace Co., Ltd., has made the largest contribution of profit, and orders continue to come in at a satisfactory rate, he adds.

Hackbridge Cable Holdings Ltd.

The past year was a record for the company, it will be gathered from our accompanying table. But Mr. C. I. Steen, the chairman, warns that as many important buyers are, for the present, restricting their purchases to a minimum, it is not expected that the current year will show the

Year to Mar.31	£ Trading Profit	£ Net Profit	% on Ord. Earn'd	% on Ord. Paid	Ord. Price High	Ord. Price Low
1949	310,926	64,298	40	20	16/7	11/1
1950	328,809	123,000	45	20	14/9	11/30
1951	247,406	71,247	25	20	15/9	9/9
1952	228,245	87,009	32	20	11/9	9/1
1953	468,308	157,307	59	20	12/4	10/4

same high figures as 1952/53. Nevertheless as the demand for the company's products must expand, the directors look forward to the future with confidence. But despite the restriction of orders, stocks and work in progress at March 31 last amounted to £661,070, an increase of nearly £30,000 over the previous year.

Metal Industries Ltd.

At March 31, the total assets of the group stood at £12,161,111 as against *£12,106,509* in the preceding year. Properties, plant, vessels, etc., figured £2,115,448 after accumulated depreciation against *£1,377,611*. Current assets amount to £6,438,006 (*£5,865,940*). There is a net balance of £618,934 (*£612,528*), of which £612,070 (*£609,179*) must be attributed to the parent organisation.

Ordinary dividends total 12% (*15%*), accounting for the sum of £253,500 (*£245,700*).

Nigerian Electricity Supply Corporation, Ltd.

The number of units sold during the year ended February 28 last increased by 8½% to 59.5 million. Bulk sales to the Electricity Corporation of Nigeria increased by a further 20%, which still represents only 9% of total power sales. The financial results for the year were given in our August 20 issue. Mr. G. Hemmant, chairman, states that the increase in revenue was due to a combination of favourable circumstances. The annual dry season was not unduly prolonged, and additional water impounded at Tenti, where the height of the dam had been raised the previous year, proved to be sufficient to provide power up to the end of the dry season, without any restriction of power consumption. In the two preceding years it was necessary towards the end of the dry season to restrict consumption, but such restriction should not be necessary in any normal year when the second Jekko power station, now approaching completion, is in operation.

Pernambuco Tramways and Power

For the year 1952, operating revenue amounted to £1,984,390 (*£1,822,868*). Revenue deductions took £1,805,227 (*£1,645,108*), leaving £179,163 (*£177,760*), plus £37,562 (*£39,940*) other income. After allowing for net interest and other deductions which showed a credit of £2,061 (*£1,120* deficit) and statutory provision £9,679 (*£11,275*), amount carried forward was £262,674 (*£52,536*), before providing for various other contingencies.

Richardsons, Westgarth & Co., Ltd.

The land side of the business continued to develop steadily and satisfactorily, Mr. O. J. Phillipson, the chairman, states. Apart from steam generating plant for the B.E.A., three Clark-Sulzer diesel engines were completed for use in connection with power generation in Victoria, Australia, and a number of high capacity Foster Wheeler boiler installations for industrial use.

Year to Mar. 31	£ Trading Profit	£ Net Profit	% on Ord. Earn'd	% on Ord. Paid	Ord. Price High	Ord. Price Low
1949	602,188	170,434	29	10	9/3	5/10
1950	646,120	280,862	48	12	10/8	6/-
1951	683,189	241,786	35	12	13/3	9/7
1952	816,699	248,771	36	12	10/7	8/4
1953	898,400	346,428	47	15	11/1	8/6

Sterling Cable Co.

In the healthy progress made by the concern (which is controlled by A. C. Cossor, Ltd.) during the year ended March 31 last, export sales were increased by some 15%—a noteworthy achievement in view of the intense competition from foreign cable firms who are allowed every form of business-getting inducement, Mr. James S. Clark, the chairman and managing director, declares. Stocks on hand and work in progress is listed at £261,853—almost £200,000 less than a year ago—indicative of the running down of stocks. Although the company's order book is healthy, it has not yet reached the level of this time last year, Mr. Clark reports, but he is confident that the situation will improve as the result of the freeing of the main metals.

Year to Mar. 31	£ Trading Profit	£ Net Profit	% on Ord. Earned	% on Ord. Paid
1951	102,331	25,625	11	7½
1952	127,303	31,682	16	12½
1953	162,513	41,109	22	15

Dividends Declared

British Thermostat Co., Ltd.—Interim of 7½% on capital which was increased by 100% scrip issue. Although this compares with the same rate last year on the smaller capital, the effective increase, the board state, does not indicate a larger total distribution than last year's 35% on the old capital.

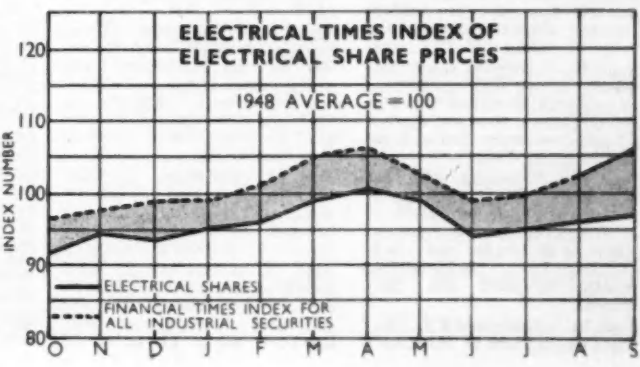
Chloride Electrical Storage.—Interim of 5% (*same*).

Crofts Engineers (Holdings).—Interim of 15% (*same*).

A. H. Hunt (Capacitors) Ltd.—Interim of 7½% (*same*).

Lancashire Dynamo Holdings.—Interim of 4% (*same*).

Telegraph Condenser Co.—Interim of 5% (*same*) but on capital increased by 20% scrip issue.



The upward trend of share prices continued during August when, once again, the most marked increase was shown by the index for all industrial shares. At the end of the month the Financial Times index for these share prices had risen by 3·0 to 105·5. Meanwhile the Electrical Times index for all electrical share prices maintains a remarkably steady rise. Present figure is 96·9 compared with the previous month's 95·9. Figures are based on average prices ruling in 1948

Commercial Information

CONTRACTS OPEN

HOME

Sept. 11.—Crosby T.C. Installation of class A sodium lighting along Seaforth Rd. (A5036). Borough Engineer, Town Hall, Waterloo, Liverpool. Deposit £2 2s.

Sept. 11.—Slough T.C. Erection of 130 concrete columns with installation of 80 W mercury lighting on various sites during 1953-54. Borough Engineer, Town Hall. Deposit £2 2s.

Sept. 11.—Walthamstow B.C. Supply of 134-140 W sodium lamps on concrete columns along part of trunk road A.406 (N. Circular Rd.). Borough Architect, Engineer and Surveyor, Town Hall, E.17. Deposit £2 2s. (See Aug. 27 issue.)

Sept. 12.—Antrim. Conversion from d.c. to a.c. at Holywell Hospital. F. D. Brown and Sons, consulting engineers, 93 Ann St., Belfast, Deposit £5 5s.

Sept. 12.—Kingsclere (Hants) R.D.C. Internal wiring of 101 council houses. Surveyor, Council Offices, Kingsclere, nr. Newbury, Berks. Deposit £1 1s.

Sept. 14.—Armagh. Electrical installation in 36 dwellings for N. Ireland Housing Trust, 12 Hope St., Belfast. Deposit 10s.

Sept. 14.—Epsom and Ewell T.C. Erection of 120 concrete lighting columns 25 ft. high with wiring, fixing of lanterns and auxiliary gear. N. Auty, Borough Engineer and Surveyor, Town Hall, Epsom. Deposit £2 2s. (See Aug. 27 issue.)

Sept. 14.—Liverpool. Light and power, wiring and installation of points in Maternity Ward of Sefton General Hospital. Garnet Chaplin, secretary, Sefton General Hospital, Liverpool 15.

Sept. 14.—N. Ireland. Electrical installations in 477 dwellings at Newtownards, 46 at Larne, 36 at Armagh and 24 at Ballymena. Separate tenders for each. N.I. Housing Trust, 12 Hope St., Belfast. Deposit 10s. each scheme.

Sept. 14.—Sunderland T.C. Electrical installations in 263 houses on Marley Pots estate at present lit by gas. Borough Engineer and Surveyor, 27 Fawcett St. Deposit £2 2s.

Sept. 14.—Swansea T.C. Applications to submit tenders for electrical installation in 82 houses on Portmead (Cadle) estate, should be made by above date to Borough Architect, The Guildhall. Deposit £2. (See Aug. 27 issue.)

Sept. 14.—West Riding. Contractors wishing to tender for lighting, heating and power installations should apply for their names to be included on lists of selected contractors for work valued at over £10,000. Applications to County Architect, Bishopgarth, Westfield Rd., Wakefield. (See Aug. 27 issue.)

Sept. 18.—Harrow U.D.C. Supply and installation of 196 140 W sodium lamps, lanterns and control gear to group A on various roads. J. H. Melville Richards, Engineer, Council Offices, Uxbridge Rd. Stanmore. Deposit £2.

Sept. 18.—Lancashire. Supply of sundry domestic and other appliances. Applications by above date to County Architect, County Hall, Preston. (Advertised in this issue.)

Sept. 19.—Bridgnorth T.C. Supply and erection of 54 cast-iron class B lighting standards with 100 W tungsten lamps and other equipment for roads on the Grove estate. Borough Surveyor, College House. Deposit £2 2s.

Sept. 19.—Enniscorthy (Eire). Installation of electrically operated kitchen equipment plus wiring and lighting installation at Mental Hospital. N. Mathews, Consulting Engineer, 42 Fitzwilliam Place, Dublin. Deposit £10 10s.

Sept. 21.—Fifeshire. Electrical work in 20 houses at Guardbridge. Robert Galbraith and Lawson, chart. quantity surveyors, 21 Crossgate, Cupar.

Sept. 21.—Haverfordwest T.C. Supply and erection of 60 h.p. mercury vapour lamps, concrete and steel columns and wall brackets, along 1¼ miles of trunk roads A.40 and A.4076. Borough Surveyor, 9 Victoria Place. Deposit £2 2s. (See Sept 3. issue.)

Sept. 21.—Hepton (Yorks) R.D.C. Electrical work in erection of 24 flats at Heptonstall and Wadsworth. N. H. Singer, architect, District Bank Chambers, Hebden Bridge. Deposit £2 2s.

Sept. 23.—Newcastle-on-Tyne T.C. Supply and installation of four electric passenger lifts in multi-storey blocks of flats on Hindhaugh St. site. City Architect, 18 Cloth Market.

Sept. 23.—Swansea T.C. Applications invited from contractors wishing to tender for electrical installation at swimming baths, St. Helens Rd. Borough Architect. The Guildhall. Deposit £2. (See Sept. 3 issue.)

Sept. 24.—Co. Down. Electrical installation at Ballylesson primary school. Architects are Ostick and Williams, 12-14 Corporation St., Belfast. Deposit £3 3s.

Sept. 28.—Stockton-on-Tees T.C. Electrical installation at Roseworth junior school. Borough Architect, 28 The Square. Deposit £1 1s.

Sept. 30.—East Riding. Installation of electrical services at Driffield secondary school. County Architect, County Hall, Beverley.

Oct. 1.—Tyrone. Complete electrical installation in Tyrone and Fermanagh Hospital, Omagh N.I. Hospitals Authority's Chief Engineer, 104 University St., Belfast. Deposit £3 3s.

Oct. 5.—Manchester T.C. Electrical installation at Moss Nook secondary school, Wythenshawe. City Architect, Town Hall. Deposit £1 1s. (See Aug. 27 issue.)

Oct. 10.—Haslemere U.D.C. Supply and erection of duplicate pumps together with electric motors and control gear at Shottermill sewage works. C. A. Best, Engineer and Surveyor, Council Offices, Museum Hill.

Oct. 12.—Halstead R.D.C. Supply of two sets of electrically-driven vertical spindle borehole type pumps and two vertical electrically-driven booster pumps plus all ancillary equipment. Engineers, John Taylor and Sons, Artillery House, Artillery Row, Victoria St., Westminster. Deposit £5.

Oct. 17.—Tyrone. Electrical installation in new buildings on

Goolnafranky estate, Cookstown, at a grammar school, secordary intermediate school and dining-room. Chief Education Officer, Education Offices, Omagh. Deposit £3 3s.

No date stated.—Bucks. Supply of electrical measuring instruments, resistances, laboratory equipment including batteries, installation equipment, cables, and radio equipment for High Wycombe College of Further Education. Applications to D. E. Cooke, Chief Education Officer, County Offices, Aylesbury. (Advertised in this issue.)

OVERSEAS

*Details of items marked * may be obtained on application to the Board of Trade, Lacon House, Theobalds Road, W.C.1, quoting reference.*

Sept. 25.—New Zealand. Auckland Electric Power Board requires supply of three 2,000 kVA 3-phase transformers. Board is at Power Board Building, Queen St., Auckland. Deposit £100. B.o.T. (Ref.: ESB 2620/53)*.

Sept. 28.—India. Supply of 31,000 yd of electric cables to various specifications for Directorate General, Supplies and Disposals, Shahjahan Rd., New Delhi. B.o.T. (Refs.: ESB 2888/53 and 2889/53)*.

Sept. 30.—Uruguay. Tenders (No. 3901/53) invited for supply of 33 950 single-phase meters between 5 A and 15 A, 220 V tension; and 3,250 direct 3-phase meters between 10 A and 100 A, 220 V system; and spares. Usinas Electricas y los Telefonos del Estado. B.o.T. (Ref.: ESB 2661/53)*.

Oct. 1.—S. Africa. Tenders invited (No. C.6700) by S. African Railways for electric signalling material. Supply of 57 facing point machines to S.A.R. Specs. Nos. 17/2 and 17A/1. Tender Board, P.O. Box 7784, Jonannesburg. B.o.T. (Ref.: E.S.B. 2637/53)*.

Oct. 6.—Egypt. Supply of 170 3-phase transformers 10,500 V h.t., 380/220 V l.t., variable capacities 150 to 500 kVA. Documents from Chief Inspecting Engr., Egyptian Govt., 41 Tothill St., S.W.1. Deposit £2 1s. (Advertised in this issue.)

Oct. 7.—Australia. State Electricity Commission of Victoria invites tenders (Spec. No. 53-54/20) for supply of two 3-phase sets of oil immersed circuit reclosers for outdoor use in 22kV 3-phase 50 c/s grounded neutral circuits, and one 3-phase gang-operated air break load interrupter fitted with enclosed arc control devices suitable for 6,600 V 50 c/s circuits. B.o.T. (Ref.: FSB 2402/53).*

Oct. 14.—New Zealand. Post and Telegraph Dept. invites tenders (No. P. and T. 150/6413) for supply of 100,000 insulators, composition; to B.S. 16. Director General (Stores Div.), G.P.O., Wellington. B.o.T. (Ref.: ESB 2185/53)*.

Oct. 15.—India. Supply of sixteen 500 kVA transformers and four 250 kVA transformers for Bombay Municipality. B.o.T. (Ref.: ESB 2887/53)*.

Oct. 16.—Australia. Supply of 12 33 kV 3-phase outdoor type oil circuit-breakers, rupturing capacity 1,000 MVA with current transformers, etc. (Contract No. F14/53) for Brisbane City Council. Documents from Dept. of Electricity, Kelvin House, Adelaide St., Brisbane, at 10s. 6d. each. B.o.T. (Ref.: ESB 2416/53)*.

Oct. 20.—New Zealand. State Hydro-Electric Dept. requires supply of five 110 kV, 2,500 MVA, 3-phase circuit-breakers and accessories for Otahuhu sub-station. Documents available at N.Z. Govt. Offices in London.

Oct. 21.—New Zealand. Stores Div. of Post Office requires supply of 200 miles of IRV and cotton braided cable for internal wiring. (P. and T. 150/6416.) Director-General (Stores Div.), G.P.O., Wellington.

Nov. 20.—Australia. Supply of twelve 11,000 V 3-phase 300 A outdoor type metalclad oil-immersed ring main tee off fuse switchgear with isolators and fuse switches, and 76 H.RC fuses. Documents from Dept. of Electricity, Kelvin House, Adelaide St., Brisbane, 10s. 6d. each. B.o.T. (Ref.: ESB 2850/53)*.

Dec. 1.—New Zealand. Supply of 466 steel transmission towers for Tuai-Gisborne 110 kV line required by State Hydro-Electric Dept., Wellington. Deposit required is £100 and bond £4,500. Copies of specifications available at N.Z. Govt. offices in London.

Dec. 1—New Zealand. Supply of 456 galvanised steel transmission line towers for Tuai-Gisborne 110 kV line for State Hydro-Electric Dept., Wellington. Contract No. 241. Documents available at N.Z. Govt. Offices in London.

Your Queries — Answered

"Ultra Vitalux Irradiator" ultra violet lamp, suppliers of? B.C.—"V" (Development & Trading) Ltd., 22 Clifton Rd., W.9. (23829)

100 W rubber handlamps, watertight, makers of? A.W.—Nettle Accessories Ltd., Harper Rd., Wythenshaw, Manchester; Asea Electric Ltd., Fulbourne Rd., E.17. (23884)

Blowers 1/25th h.p., makers of? E.R.—Martindale Electric Co. Ltd., Westmorland Rd., N.W.9, and Service Electric Co. Ltd., Honeypot Lane, Stanmore, Middx., offer to assist. (23856)

"Midsaw" universal woodcutter, makers of? S.E.—Midland Saw & Tool Co. Ltd., Midsaw Works, Pope St., Birmingham 1. (23860)

Lawnmower units to convert to electric drive, makers of? C.D.—Power Appliances, 49 Waverley Rd., Ewell, Surrey; Alpha Machines (Tools) Ltd., Avenue Works, Gidea Park, Romford. (23869)

An electric tap to replace an ordinary tap for providing instantaneous hot water, suppliers of? E.E.—We presume this refers to the "Hotap" supplied by L. Apple Ltd., 60 Brewer St., W.1. (23841)

The above are selected from questions we have answered this week. If you have a query, send it to us.

ANSWER WANTED

Horace Batten & Co., producers of the "Hobat" vacuum cleaner, address for? L.B. (23896)

CONTRACTS PLACED

Glasgow T.C. Supply of 100,000 yd of aerial cable, Scottish Cables, Ltd., £3,935.

Hazel Grove and Bramhall (Ches.) U.D.C. Supply and installation of various street lighting equipment at Bramhall, N. Western Electricity Board.

Sheffield T.C. Electrical work in 117 dwellings at Manor Park (£3,289), and same in 42 dwellings at Hackenthorpe (£704), Hobson and Scott, Ltd.; also electrical work in 176 dwellings at Greenhill (£3,343), and in 372 dwellings at Hackenthorpe (£5,942), M. B. Munks.

Newcastle-on-Tyne T.C. Electrical installation in new school of art and industrial design, Electra (Birmingham, 1935), Ltd., £1,255.

Stoke Newington B.C. Supply and erection of 41 lighting columns and other works on Woodberry Down estate, London Electricity Board, £2,852.

Whaley Bridge U.D.C. Laying of street lighting services and cables, N. Western Electricity Board, £3,245.

Windsor T.C. Electrical installations in 50 houses at Manor Farm site, F. E. Morris, £1,278.

Worcestershire. Electrical work in Pershore Inst. of Horticulture and in greenhouses, F. H. Wheeler and Co. Ltd., £3,203.

TRADE NOTES

Changes of Address. — The Bristol Office of the English Electric Co. Ltd. has been transferred to 74/76 Broadmead, Bristol 1; telephone number, Bristol 27304. The Television and Domestic Appliance Service Department remains at 155 Whiteladies Rd., Bristol 8; telephone number, Bristol 38253/4.

On Saturday next, September 12, the London office of G. & J. Weir, Ltd., is moving to Dunster House, Mincing Lane, E.C.3. The telephone number remains, Mansion House 1985.

Owing to extensions at the Wembley works of Truvox Ltd., the general office, home sales and export departments of the company are now temporarily located at 15 Lyon Rd., Harrow. Telephone, Harrow 9282.

New Phone No.—The telephone number of the Iron and Steel Board is now Trafalgar 8833.

PRICE OF CABLE METALS AND OTHER MATERIALS
(at Tuesday night)

	£ s. d.	New York price
COPPER, electrolytic	228-230	—
,, (3 months)	215½-216	—
LEAD, good soft pig (foreign)	96-96½	112 0 0
TIN (99-99·76%) (Cash)	617½-620	—
,, ,, (3 months)	611-612	—
ALUMINIUM, commercial purity (del.)	150 0 0	—
ZINC	71-71½	84
ARMOURING:		
Galv. Steel Wire (0·104 in.) ...	50 10 0	—
Mild Steel Tape (0·04 in.)	40 0 0	—

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

General Automatic Iron Co., Ltd. Petition for winding-up presented and directed to be heard at Royal Courts of Justice, London, on Oct. 5. Interested persons should contact Tarlo Lyons and Co., 16 Manchester Sq., W.1, by Oct. 3.

John Raymond (Electrical) Ltd. G. W. Sisman, Official Receiver, of 26 Baldwin St., Bristol, the liquidator, has been released as from Aug. 11.

BANKRUPTCY ACTS

Receiving Orders

Hastings. James F. Thompson, and Henry A. Why, electricians trading as Southern Radio TV Electrical Services at 52 Wellington Mews, Hastings. Date of receiving order, Aug. 28.

First Meeting

Barnstaple. George R. Rosvall, electrician, trading at The Corner House, St. Giles, Torrington. First meeting at Official Receiver's Office, 26 Baldwin St., Bristol, on Sept. 15, at 11 a.m., and public examination at Guildhall, Barnstaple, on Oct. 6, at 2.30 p.m.

York. Edwin Vasey, electrician of 21 Bridge Rd., Bishopthorpe. First meeting at Official Receiver's Office, North British Buildings, 29 East Parade, Leeds today (Thurs.) at 11 a.m. Public examination at the Law Courts, Clifford St., York, on Oct. 22 at 10.30 a.m.

Public Examination

William R. Kerr, electrical engineer, of The Green, Whittington, nr. Lichfield, Staffs. At public examination liabilities of £680 admitted against assets of £15. Debtor said he started business in 1948 and admitted keeping no books of account and underestimating on contracts. He ceased trading in July, 1952. Examination was adjourned.

Appointment of Trustee

Birmingham. Richard H. Myers, gas and electrical engineer, trading as T. Myers and Son, at 169 Aston Rd., Birmingham. Trustee is R. F. Bendall, C.A., 126 Colmore Row, Birmingham.

Intended Dividends

Plymouth. William H. Axworthy, electrical contractor trading at John Lane, Cobourg St., Plymouth. Last day for receiving proofs, Sept. 18. Trustee is F. B. Goodman, Official Receiver, 24 Lockyer St., Plymouth.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Constat. B712,795. Class 9. Thermostats and thermally operated automatic electric time switches. Thermostatic Controls Co., Avenue Rd., Hampton, Middx.

Elastophone. 718,323. Class 9. Insulated electric wire and cables. Hartley Electromotives Ltd., 1a, Harrington Rd., S.W.7.

Hylumia. 719,182. Class 7. Sparking plugs and power operated tools. 719,183. Class 17. Electric insulating materials. K.L.G. Sparking Plugs Ltd., K.L.G. Works, Putney Vale, S.W.15.

Scientaire. 719,121. Class 9. Electrical apparatus and instruments. Scientaire Ltd., 2 Blenheim Terrace, Leeds 2.

Symphony. 717,316. Class 9. Sound amplifiers, magnetic tape sound recorders, etc. Northern Radio Services, 16 Kings College Road, N.W.3.

BUSINESS PROSPECTS

HOME

Barnstaple R.D.C. It is proposed to build 50 houses each at Braunton and Fremington, 10 each at Combe Martin and Bickington, and four at West Down.

Belfast. Two long-term development schemes proposed for Old Lodge Rd. area. They will provide for nearly 80 dwellings.

Bentley-with-Arksey (Yorks) U.D.C. Erection of 42 houses under contract No. 51. R. N. Penlington, Engineer, Council Offices, Cooke St.

Berwick T.C. J. L. Thomas of Ashington are considering erection of premises on Tweedside trading estate. Seventy-four houses are to be built on Prior Park Estate.

Bletchley U.D.C. Tenders for site works being invited prior to erection of 200 of an ultimate 520 dwellings on Castles estate.

Bolton. Plans in hand for extension work and erection of offices in Kay St. for Joseph Young and Sons, Ltd.; and also for extension of printing works of Tillotsons (Bolton), Ltd.

Bristol T.C. Construction of junior school at Henbury. City Architect, Council House, College Green, Bristol 1.

Burnley. Plans approved for first £151,000 phase of extensions to Municipal College for inclusion in 1954-55 building programme.

Bury St. Edmunds T.C. Site in Mildenhall Rd. has been purchased for erection of 330 dwellings at a cost of £450,000.

Cheadle (Staffs) U.D.C. Approval sought for erection of further 22 houses in district as well as 20 at Forsbrook, 12 at Cheddleton and 8 at Dilhorne.

Craghead (Dur.). Plans being prepared by N. Eastern Trading Estates Ltd. for factory extensions for Webwear (Stanley) Ltd.

Dagenham. Essex Mica Co., Ltd., 10 Hainault St., Ilford, are building a factory.

Denbighshire. Tenders to be invited shortly for rewiring of Haulfre Children's Home.

Derry. Rural Council has approved application for £140,000 loan for new housing programme. Work is in progress on 22 houses under new buildings No. 2 contract.

Doncaster. W. Nuttall, Ltd., are planning to extend their Athron St. factory.

Exeter T.C. Erection of 144 dwellings on Whipton Barton estate. H. B. Rowe, City Architect, Municipal Offices.

Farnworth T.C. On a site near Highfield Rd., 381 houses are to be built.

Glendale (Northumb.) R.D.C. Negotiations in hand for erection of 70 houses on Westwood Ave. site.

Grangemouth. I.C.I. (Dyestuffs), Ltd., propose to erect laboratory and works extension. Estimated cost is £22,000.

Halifax. A £140,250 R.C. secondary school at Illingworth has been included in next year's building programme.

Hammersmith. R.T. Products, Ltd. are to erect factory in Latimer Rd. Architects are Mayell, Webb and Hart, 173 Holland Park Ave., W.11. Also, Clifford, Tee and Gale, 5 Buckingham Palace Gdns., S.W.1, are architects for research laboratory extension in Larden Rd., costing £124,500 for C.A.V.

Hartley Wintney (Hants) R.D.C. It is proposed to build 40 houses in Pankridge St. Also, approval to layout of 92 dwellings at Hook has been received.

Leek U.D.C. Erection of 40 flats on Haregate estate. J. A. Gilchrist, Architect, Town Hall.

Loftus U.D.C. Consideration being given to proposed alterations at town hall.

Midhurst R.D.C. Erection of 36 dwellings at Linchmere and eight at Elsted. Council's Architect, T. Greenfield, "Newstead," Midhurst.

Newcastle-on-Tyne T.C. Land is to be appropriated near Slatyford Lane for erection of two secondary schools.

Northern Ireland. Ministry of Commerce is seeking site at Strabane for erection of factory to manufacture component parts.

North Riding C.C. is being asked to borrow £45,730 for erection of South Bank primary school, and £56,000 for Thornaby primary school. Ambulance station to be built at Richmond.

Northumberland. Plans and estimates approved for proposed Prudhoe secondary school.

Queensbury (Yorks) U.D.C. Construction of 20 bungalows on Cockhill estate, Shelf. Engineer and Surveyor, Council Offices.

Rutherglen (Lanark). Extensions to Donniebrae works are planned by Thomson, MacCrae and Sanders, architects, 212 Bath St., Glasgow.

Salford T.C. Construction of two 3-storey blocks of (18) flats in Cumberland St. City Engineer's Office, Town Hall.

Sandwich (Kent) T.C. Scheme proposed for electrification of Woodnesborough pumping station at estimated cost of £5,800.

Sheffield T.C. Erection of 2,000 flats in Norfolk Park district has been approved.

Smethwick. Edwards (Bearwood), Ltd., propose alterations and additions at 601 Bearwood Rd.

Stoke-on-Trent. A £27,000 licence has been issued to Michelin Tyre Co., Ltd., for proposed works extensions.

Stockton-on-Tees T.C. Eighty houses and 70 flats to be built at Portrack.

Strood (Kent) R.D.C. Erection of 20 houses at Cobham. Engineer and Surveyor, Council Offices, Frindsbury Hill.

Turton (Lancs) U.D.C. Total of 224 houses are to be built in 1954.

Swansea T.C. Scheme in hand for erection of 129 houses on West Cross estate.

Wardley (Dur.). Fennell and Co. Bridge End Chambers, Chester-le-Street, are architects for new Methodist church.

Washington (Dur.) U.D.C. A new bus station is estimated to cost £9,500. It may be some time before tenders are invited.

Wem (Salop) R.D.C. Approval sought for erection of 55 houses at Shawbury, 45 at Prees and about 20 at Aston Park; plus 26 on six other sites.

Westminster. Architect for erection of 7-storey building in Regency St. is L. C. Norton, 4 St. George St., Hanover Sq., W.1.

West Sussex. Among projects included in next year's building programme are Worth R.C. secondary school (£95,000), Billingshurst secondary school (£140,000), and junior and infants' school at Crawley (£102,784).

Whitehaven. Plans for clinics, chest centre and divisional health offices estimated to cost £50,743, have been approved.

Wigan T.C. Application to be made to borrow £69,722 for erection of 51 houses on Worsley neighbourhood unit.

Willesden. Kilburn secondary school is expected to cost about £183,600.

OVERSEAS

U.S.A. E. E. Rempfer and Assocs., 215 Sixth St., S.E. Minneapolis, wish to contact U.K. manufacturers of mechanical power transmissions, electric motors and speed reducers, to represent them in the area covered by their salesmen.

MEETINGS TO NOTE

MONDAY, SEPT. 14

A.S.E.E. (Central London Branch).—"Electric Tools." N. T. Tharme. S. Ermin's Hotel, Caxton St., S.W.1, 7 p.m.

E.I.B.A.—Inaugural meeting of new branch to cover N. Metropolitan area at Eastern Board, Station Rd., Wood Green, 2.30 p.m.

TUESDAY, SEPT. 15

A.P.L.E. Annual Conference and Exhibition at Liverpool continues until Sept. 18.

WEDNESDAY, SEPT. 16

INCORP. PLANT ENGRS. (Glasgow). "Education and the Plant Engineer." H. N. Henry. Building Centre, Sauchiehall St., 7 p.m.

A.S.E.E. (Manchester Branch).—"Electronics in Industry." A. Williams. Engrs. Club, Albert Sq., 7.30 p.m.

THURSDAY, SEPT. 17

INSTN. OF ELECTRONICS. "Semi-Conductors." J. S. Blakemore. Royal Soc. of Arts, W.C.2, 7.30 p.m.

A.S.E.E. (Portsmouth Branch).—"Association Affairs." E. A. Bromfield. Air Balloon, Portsmouth, 7.15 p.m.

A.S.E.E. (Kent Branch).—"Vee Belt Drives." J. H. Cleator. County Hotel, Canterbury, 8 p.m.

EXHIBITION DIARY

Radio and Television. 20th Show at Earls Court opened on Sept. 1 and closes on Sept. 12.

Engineering, Marine and Welding. 19th Show at Olympia continues until Sept. 17.

Electro Medical. This exhibition and the first International Congress of Physical Therapy opened at Central Hall, Westminster, on Sept. 7. It closes on Sept. 11.

Welsh Industries Fair. Taking place at Sophia Gdns., Cardiff, between Sept. 9 and 19.

Nursing. 38th Annual Exhbn. opens at Seymour Hall, London W.1, on Oct. 12 and closes on Oct. 16.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London, W.C.2.

Agrimech Developments Ltd. 265 Gt. King St., Hockley, Birmingham, 19. Agricultural, dairy, horticultural, civil, motor, mechanical, electrical and general engineers, etc. Cap.: £100. Dirs.: V. E. Burgess and L. G. Collins.

Lawton and Sons Ltd., 125 St. Thomas' Rd., Derby. Dealers in and repairers and manufacturers of radio, television, gramophone and electrical goods, sports goods, toys, etc. Cap.: £3,000. Dirs.: R. Lawton and J. Lawton.

F. Maddocks Ltd. 127 Moor Lane, Woodford, Ches. To take over business of electrical engineer carried on as "F. Maddocks," at Woodford, Ches. Cap.: £1,000. Dirs.: F. A. Maddocks and Mrs. B. G. Maddocks and R. G. Broome.

Midland Resistance Co., Ltd., Central Chambers, 47 Albert St., Rugby. Electrical, radio, lighting, telephone, mechanical and general engineers, consulting wireless experts, etc. Cap.: £2,500. Dirs.: D. I. Williams, T. W. White and W. O. Rydings.

Morgans Aerial Services Ltd. 16 Manchester Sq., W.1. Television, radio, radar, electronic and mechanical engineers, etc. Cap.: £500. Dirs.: L. C. Gaskin and W. J. Taverner.

Quartzglass Ltd. Manufacturers of and dealers in fused quartz for optical, electrical and chemical purposes, etc. Cap.: £100. Dirs.: to be appointed by subs. Subs.: R. D. Norman, 11 Groveland Way, New Malden; and J. D. Forsyth, 74 Church Drive, North Harrow.

E. Robinson, Ltd. Designers and manufacturers of and dealers in electrical, radio, sound recording and television apparatus, etc. Cap.: £10,000. Dirs.: C. H. Robinson, 35 Austen Ave., Nottingham; and M. Robinson.

A. Rundle (Upper Norwood), Ltd. Manufacturers of and dealers in mechanical, electrical, mathematical, chemical, physical, photographic, optical and scientific instruments, etc. Cap.: £100. Dirs.: to be appointed by subs. Subs.: C. H. Cassell, 13 St. Louis Rd., West Norwood, S.E.27, and A. W. Rundle, Little Savernake, The Woodend, Wallington, Surrey.

Scott Engineering (Bournemouth) Ltd. 902 Wimborne Rd., Bournemouth. Light engineering contractors to aeroplane manufacturers, mechanical, electrical, radio and general engineers, etc. Cap.: £5,000. Permanent dirs.: A. Conroy and E. L. Scott.

E. and W. Smith (Electrical Engineers) Ltd. 22 Whitworth Rd., Rochdale. Cap.: £1,000. Dirs.: E. S. Smith and W. Smith.

P. E. Thomas Ltd., Thermal Works, Glan Rd., Porthcawl. Refrigerating, ventilating and heating and air conditioning engineers, etc. Cap.: £2,000. Dirs.: not named. Subs.: Marjorie Evans and J. L. Green.

W. J. Thompson (Optical) Ltd., 28 Mackenzie St., Slough, Bucks. Electrical and electronic engineers and contractors, wire drawers, optical engineers, etc. Cap.: £1,000. Dirs: W. J. Thompson and W. J. Thompson junr.

T.L.F. Electricals Ltd. 119 St. Cuthberts Rd., Gateshead, Co. Durham. Manufacturers of and dealers in transformers, converters, armatures, etc. Cap.: £2,000. Dirs.: J. H. Ford and J. W. Low.

Unitelex (London) Ltd., Chesham House, Deptford Broadway, S.E.8. Manufacturers and wholesalers of electrical equipment and fittings, etc. Cap.: £500. Dirs.: A. J. Garland and B. D. Garland.

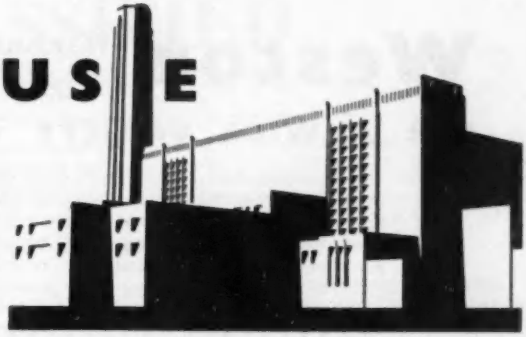
Westbourne Grove Supplies Ltd. 115 Westbourne Grove, W.2. Importers, exporters, wholesale and retail merchants, buying and selling agents and dealers in merchandise of all kinds, including electric toasters and electrical goods, wireless, television, etc. Cap.: £100. Dir.: Mrs. V. Harz.

West Lancashire Electronic Products Ltd., Oakhill Works, 134 Liverpool Rd., Lydiate, nr. Liverpool. Cap.: £500. Dirs.: R. Northmore and G. R. Singleton.

S. J. Wheatley (Campden) Ltd., Lower High St., Chipping Campden. Electricians, mechanical engineers and manufacturers, etc. Cap.: £1,500. Dirs.: S. J. Wheatley and Mrs. K. B. Wheatley.

W. J. Wooster Ltd., Eskdale Rd., Uxbridge, Middlesex. Precision, mechanical, motor, aeronautical, electrical and general engineers, etc. Cap.: £1,000. Dirs.: W. J. Wooster and Mrs. Wooster.

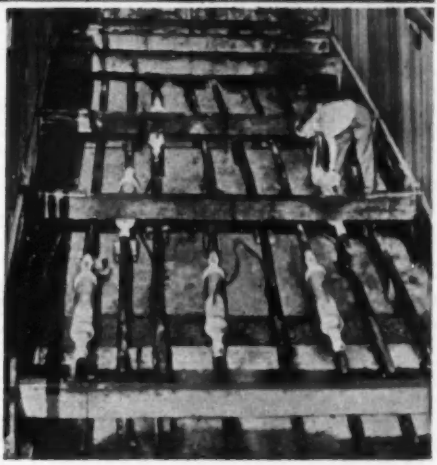
RYE HOUSE



Two important contracts carried out recently provide circuits for connecting the B.E.A. Eastern Division's fine new generating station at Rye House, Hertfordshire, to the Grid.

feeds the Grid through HENLEY Overhead Lines and Cables

The installations by Henley's Contract Department shown here are the Rye House-Hatfield-Watford 132kV line at Elstree, and a joint bay with Henley 33kV oil-filled cables.



A.P.L.E Conference
Liverpool Sept. 15-18
HENLEY STAND 31

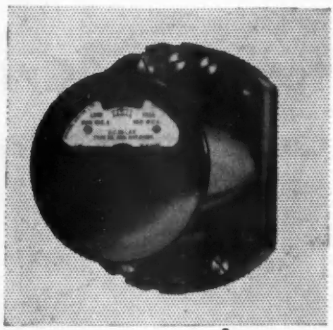
HENLEY CABLES

W. T. Henley's Telegraph Works Co. Ltd.
51-53 Hatton Garden, London, E.C.1

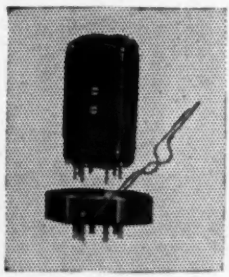
Weston Moving Coil Relays

FOR A WIDE VARIETY OF APPLICATIONS

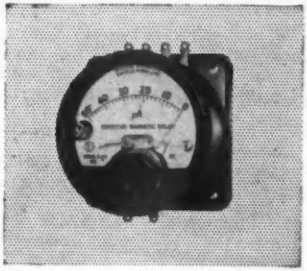
The simplicity and reliability of relay control has led to the ever increasing use of WESTON MOVING COIL RELAYS. Let us have a note of your relay problems and we will be pleased to advise on the most suitable model for any set of conditions. Enquiries should be accompanied by full particulars of both control and local circuits.



MODEL S54. *A relay of extreme sensitivity with wide applications in Laboratory and Industrial Control. The high torque developed by the moving system ensures positive contact pressure.*



MODEL S115. *A relay of extremely small size, functioning as an 'on-off' switch. Can be operated on a power input as low as 5 microwatts.*



MODEL S124. *A highly sensitive relay with magnetic hold-on contacts having a higher rating than those of the above models.*

SANGAMO WESTON LIMITED

ENFIELD · MIDDLESEX

Tel: Enfield 3434 (6 Lines) & 1242 (4 Lines) *Grams: Sanwest, Enfield*

Scottish Factory: Port Glasgow, Renfrewshire. Port Glasgow 41151

Branches: London, CHAncery 4971 Glasgow, Central 6208 Manchester, Central 7904 Newcastle-on-Tyne, Newcastle 26867 Leeds, Leeds 30867 Liverpool, Central 0230 Wolverhampton, Wolverhampton 21912 Nottingham, Nottingham 42403 Bristol, Bristol 21781 Southampton, Soton 3328 Brighton, Brighton 28497

CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WORK WANTED WANTED : FOR SALE

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia Street, London W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 42s. per inch, and all other classified advertisements at 3s. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

TENDERS INVITED

LANCASHIRE COUNTY COUNCIL

APPLICATIONS are invited for the supply of the following ELECTRICAL EQUIPMENT to the Lancashire County Council. The successful firms will be required to deliver direct to all county premises in both large and small quantities:

1. Broadcast equipment.
2. Electric fires.
3. Refrigerators.
4. Sewing machines.
5. Washing machines.
6. Clocks, mechanical and electric.
7. Electric irons, with and without thermostatic control.
8. Floor polishing machines.
9. Technical drawing equipment.
10. Food mixing machines.
11. Vacuum cleaners.
12. Electric water heaters.
13. Wet and dry batteries.
14. Electric cookers.

Firms desiring to tender should make application to the County Architect, County Hall, Preston, not later than September 18, 1953, indicating for which item or items they wish to quote. (F 106)

COUNTY BOROUGH OF SWANSEA

Swansea Swimming Baths, St. Helen's Road.

TENDERS FOR ELECTRICAL INSTALLATION

ELECTRICAL ENGINEERS wishing to tender for the Electrical Installation for Swansea Swimming Baths, St. Helen's Road, are invited to apply to the Borough Architect, The Guildhall, Swansea, on or before September 23, 1953, for plans, specifications and conditions of contract. These will be supplied upon payment of a deposit of £2, provided the applicant gives satisfactory evidence of having previously carried out work of a similar character. The deposit will be refunded after delivery of a bona-fide tender (not subsequently withdrawn) and the return of all documents. The lowest or any other tender will not necessarily be accepted.

T. B. BOWEN,
Town Clerk.

The Guildhall,
Swansea.
August 25, 1953. (F 39)

EGYPTIAN GOVERNMENT

TENDERS are called for by the Director General, Cairo Electricity and Gas Administration, for the supply of 170 3-phase TRANSFORMERS, 10,500 V h.t., 380-220 V l.t., variable capacities 150 to 500 kVA.

Tenders should be submitted to the Director General, Cairo Electricity and Gas Administration, 53 Fouad El Awwl Street, Cairo, Egypt, not later than 10 a.m. on October 6, 1953.

Copies of the necessary conditions of tender, specification, etc., can be obtained on application to the Chief Inspecting Engineer, Egyptian Government, 41 Tothill Street, London S.W.1, against remittance of £2 1s. per set, which sum must be prepaid and is not returnable. Copies of these documents are also available for scrutiny at the above address. Cheques must be endorsed permitting transfer to an Egyptian Government account.

Reference No. 44/Elec. and Gas 3/2/561 must be quoted in all correspondence. (F 142)

BUCKINGHAMSHIRE EDUCATION COMMITTEE

TENDERS are invited for supply of the following classes of equipment to the High Wycombe College of Further Education:—

1. Electrical Measuring Instruments.
2. Electrical Resistances.
3. Radio Equipment.
4. Electrical Laboratory Equipment including Batteries.
5. Electrical Installation Equipment.
6. Electrical Cables.

Applications for tender forms should be made to me immediately. Firms interested should indicate the class(es) of equipment for which they wish to tender.

D. E. COOKE,
Chief Education Officer.

County Offices,
Aylesbury. (F 105)

APPOINTMENTS VACANT

Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.

NORTH WESTERN ELECTRICITY BOARD

APPOINTMENT OF
ASSISTANT (STATISTICS AND RECORDS)
Commercial Section, Consumers' Engineer's Dept., Kendal

APPLICANTS should have had experience in the collation of statistical information in respect of tariffs, sampling, surveys, sales of apparatus, energy purchased and sold, etc. Experience in the setting up and maintenance of consumers' records would be an advantage.

Salary scale: £460 to £520 p.a. Grade 2. N.J.C. conditions.

APPOINTMENT OF
ASSISTANT (DOMESTIC AND COMMERCIAL SALES)
Consumers' Engineer's Dept., Kendal

Applicants should have had experience in exhibition and display organisation and advertising, and have a good knowledge of agricultural and horticultural applications of electricity.

Salary scale: £460 to £520 p.a. Grade 2. N.J.C. conditions.

Applications to the Sub-Area Manager, No. 6 (Lakeland) Sub-Area, Castle Green, Kendal, by September 19, 1953. (F 107)

COUNTY BOROUGH OF WIGAN

Borough Engineer's Office

APPLICATIONS are invited for the established post of ELECTRICAL ENGINEERING ASSISTANT in the Borough Engineer's Department, at a salary in accordance with A.P.T. Division Grade 5 (£586 to £645).

Applicants must be suitably qualified and the person appointed will take over the responsibility, under the Borough Engineer, of the Streets Lighting Section, and of electrical matters in connection with installation of services to new housing and public buildings, and maintenance of existing services and plant.

Applications, on forms to be obtained from the Borough Engineer, Municipal Buildings, Hewlett Street, Wigan, and giving the names of two referees, should be delivered to the Borough Engineer, not later than Wednesday, September 23, 1953.

ALLAN ROYLE,
Town Clerk.

Municipal Buildings,
Wigan.
September 3, 1953. (F 116)

BRITISH ELECTRICITY AUTHORITY

London Division

APPLICATIONS are invited for the following superannuable posts. Salary, including London Allowance, and conditions of service in accordance with N.J.B. Agreement, Schedule "A" or "C." Qualifications entitling to Graduate Membership of the I.E.E. or I.Mech.E. an advantage.

ASSISTANT SHIFT CHARGE ENGINEER
West Ham Generating Station

Sound practical and technical training in electrical and mechanical engineering with practical experience in efficient operation of power station plant. Will be expected to carry out duties in control room and boiler house as required. Salary, Class "H," Grade 9, £714 p.a.

ASSISTANT MAINTENANCE ENGINEER (MECHANICAL)
Taylors Lane Generating Station

Sound technical training with experience in maintenance of modern h.p. power station plant. Salary, Class "F," Grade 9, £637 7s. p.a.

ASSISTANT ENGINEER (EFFICIENCY)
Brunswick Wharf Generating Station

Sound technical training with experience in investigation of technical problems, plant testing and efficiency desirable, also knowledge of operating statistics. Salary, Class "H," Grade 11, £637 7s. p.a.

ASSISTANT ENGINEER (ELECTRICAL TEST)
Brunswick Wharf Generating Station

Sound electrical experience with special knowledge of protective systems and relays. Salary, Class "H," Grade 13, £549 3s. p.a.

GENERAL ASSISTANT ENGINEER
Thames Grid Control Area, London

Power station experience an advantage. Successful candidate must be prepared to work shift hours if required. Salary in scale, Class "AX," Grade 8, £526 1s. to £670 19s., rising to ultimate maximum, "EX" 9, £749 14s. p.a.

Application may be made on form obtainable from Divisional Secretary, B.E.A., London Division, Generation House, Great Portland Street, W.1, and be received within 14 days of this advertisement. (F 127)

HER MAJESTY'S COLONIAL SERVICE

APPLICATIONS are invited for the following posts:
WIRELESS ENGINEERS
Posts and Telegraphs Department, Nigeria (CDE.108/14/05)

Duties include supervision of African and European staff; preparation of estimates for the installation and maintenance of h.f. and v.h.f. wireless equipment and the supervision of such works.

Appointment will either be on three years' probation for pensionable employment in the salary scale, £850 to £1,540 or on contract at £935 to £1,719 point of entry depending on war service and approved experience. In the case of contract appointments a gratuity of £100 to £150 per annum is payable on satisfactory completion of contract.

Free passages are granted for the officer and his wife and assistance of up to £75 each for a maximum of two children is granted in respect of their passages or maintenance in the United Kingdom. Furnished quarters, if available, are provided at low rental. Leave is granted at the rate of 7 days for each month of resident service in a tour of 18-24 months.

Candidates, between the ages of 25 and 35, must have passed or be exempt from sections A and B of the examination for Associate Membership of the Institution of Electrical Engineers, or be Assistant Engineers in the British Post Office, and should have had considerable experience on installation and maintenance of h.f. and v.h.f. wireless equipment.

Apply in writing to the Director of Recruitment, Colonial Office, Great Smith Street, London S.W.1, giving briefly age, qualifications and experience. Mention the reference number shewn against the post applied for. (F 129)

BRITISH ELECTRICITY AUTHORITY

North Eastern Division

APPLICATIONS are invited for the position of JUNIOR ENGINEER in the Electrical Measurements Section of the Technical Department at Darlington.

The successful candidate's work will be chiefly concerned with the maintenance of electrical measuring instruments. Technical education should be at least National Certificate standard, and apprenticeship in instrument manufacture and testing would be considered an added advantage.

The salary for the appointment (which is superannuable) will be in accordance with Grade 9, Schedule "C" of the National Joint Board Agreement (£360 to £556 per annum) and commence at a point commensurate with qualifications and experience.

Forms of application may be obtained from Divisional Establishments Officer, British Electricity Authority, North Eastern Division, Carliol House, Newcastle-upon-Tyne 1, to whom they should be returned to arrive not later than September 30, 1953. (F 130)

HER MAJESTY'S COLONIAL SERVICE

APPLICATIONS are invited for the following post
PRINCIPAL
Telecommunications Training Centre,
Posts and Telegraphs Department, Nigeria.

Duties cover organisation and administration of Telecommunications Training Centre, including preparation of syllabuses for all courses in curriculum and supervision of student welfare.

Appointment is either pensionable, on probation, at a fixed salary of £1,680 per annum, or on contract at a fixed salary of £1,870 per annum, plus a gratuity of £150 per annum on satisfactory completion of contract. Free first-class passages are provided for the officer and wife, and assistance of up to £75 each for a maximum of two children is granted in respect of their passages or maintenance in the United Kingdom. Furnished quarters if available provided at low rental. Leave is granted at rate of 7 days for each month of resident service in tour of 18-24 months.

Candidates under 40 years of age should hold a university degree in electrical engineering or be corporate members of the Institution of Electrical Engineers. They should have had considerable experience in telecommunication subjects and of organisation in a technical training institution. Preference will be given to candidates who have had practical experience in some branch of telecommunications engineering.

Apply in writing to the Director of Recruitment, Colonial Office, Great Smith Street, London, S.W.1, giving briefly age, qualifications and experience. Mention the reference number (CDE 108/14/07). (F 124)

NORTH EASTERN ELECTRICITY BOARD

Wear Sub-Area

APPLICATIONS are invited for the appointment of DEMONSTRATOR, Durham district. Applicants should have a certificate of a recognised domestic science training college and/or the E.A.W. Certificate, preferably the latter; also considerable experience as a demonstrator or assistant demonstrator in the Electricity Supply Industry

Salary, Grade 1, £390/470. Annual increments of £20 up to £42): beyond £420 increments subject to certificate of competence. N.J.C. conditions of service.

Applicants outside the industry must apply to local Employment Exchange. Applications stating age, qualifications and experience should be forwarded to the Secretary (Establishments), The North Eastern Electricity Board, Carliol House, Newcastle-upon-Tyne, 1, within ten days of the appearance of this advertisement. (F 99)

BRITISH ELECTRICITY AUTHORITY

Midlands Division

CLERK OF WORKS (Electrical) required at Drakelow Generating Station. N.J.B. service conditions, superannuable appointment, salary within Schedule "C." Grade 5, commencing in range £649 to £790, ultimately rising to £858 per annum.

Candidates should have received a sound, practical training in power station construction, and be capable of supervising and co-ordinating site erection works, particularly with regard to h.t. switchgear. Suitable technical qualifications an advantage.

Apply on form AE6 available from the Establishments Officer, 53 Wake Green Road, Moseley, Birmingham 13, by September 26, 1953. (F 126)

METER TESTER AND REPAIRER

REQUIRED by the NYASALAND GOVERNMENT ELECTRICAL SERVICES DEPT. for one tour of 2-3 years in the first instance with prospect of permanency. Commencing salary etc., according to experience in scale £747, rising to £1,103 a year. Free passages. Outfit allowance £30 in certain cases. Candidates under 35 must have had considerable experience of testing, and repairing a.c. single and polyphase electricity meters, including maximum demand indicators and time clock mechanism and should be conversant with the United Kingdom Electricity Meter Act.

Write to the Crown Agents, 4 Millbank, London, S.W.1, State age, name in block letters, full qualifications and experience and quote M2C/30142/EE. (F 122)

BRITISH ELECTRICITY AUTHORITY

South Wales Division

Vacancy No. 70/53.

APPLICATIONS invited for superannuable N.J.B. appointment of ASSISTANT SHIFT CHARGE ENGINEER, Upper Boat Power Station. Salary H.9 (£380 to £706 p.a.).

H.N.C. and regular apprenticeship desirable. Operating experience in modern generating station essential.

Application forms obtainable from the Secretary, South Wales Division, British Electricity Authority, Twyn-y-Fedwen Road, Gabalfa, Cardiff, should be returned by September 21, 1953. (F 98)

CITY OF CARDIFF

City Surveyor's Department

APPLICATIONS are invited for the position of ELECTRICAL ENGINEERING ASSISTANT in the above Department at a salary in accordance with A.P.T. Grade 4/5 of the National Scales of Salaries (£555, rising to £645 per annum).

Candidates must have had experience in the preparation of drawings, schedules and specifications for electrical installations in schools, offices, workshops and other public buildings. They must have had good practical experience in all classes of electrical installation work and will be required to supervise contracts and certify progress and final payments.

Candidates should possess the Higher National Certificate in Electrical Engineering and membership of the I.E.E. would be an advantage.

Applications, giving full details of experience, qualifications, etc., together with the names and addresses of three persons to whom reference may be made, should be delivered to me, in a sealed envelope endorsed "Appointment of Electrical Engineering Assistant, A.P.T. Grade 4/5," not later than September 19, 1953.

S. TAPPER-JONES,
Town Clerk.

City Hall,
Cardiff.
August 29, 1953. (F 115)

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following post:—

JUNIOR ENGINEER
Brimsdown Generating Station.

Salary, Class "J/18" £427 to Class "J/14" £572 (including London Weighting) according to qualifications and experience.

Duties include assisting in the Electrical Control Room and experience in the technical operation of electrical boiler house and turbine house plant, testing, etc., and provide a suitable basis for promotion to higher technical grades.

Previous experience in a generating station and/or technical training to the standard of the Ordinary National Certificate or its equivalent will be an advantage.

Apply by September 19, 1953, giving age and details of qualifications and experience to the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14.

W. N. C. CLINCH,
Controller.
(F 117)

ASSISTANT CHIEF ENGINEER AND DEPUTY MANAGER

ELECTRICITY AND COLD STORAGE DEPARTMENT

REQUIRED by the GOVERNMENT OF THE LEEWARD ISLANDS FOR ST. KITTS-NEVIS, for 3 years with prospect of permanency. Salary equivalent to £800 a year, rising to £900 a year. Free passages. Candidates between 28 and 40 years must have a sound knowledge of practical engineering with workshop training and should have reached at least H.N.C. standard in electrical engineering. They should have had experience in the installation, testing and maintenance of transmission and distribution lines up to 11 kV. in modern power station operation, together with maintenance of diesel engines up to 451 h.p.

Write to the Crown Agents, 4 Millbank, London S.W.1, state age, name in block letters, full qualifications and experience and quote M2C/30127/EE. (F 109)

BRITISH ELECTRICITY AUTHORITY

Midlands Division

JUNIOR ENGINEER is required in the Metering Section of the Technical Department. N.J.B. service conditions, superannuable appointment, salary within Schedule "C." Grade 9, commencing in range £390 to £525, ultimately rising to £572.

Laboratory and metering experience, especially in the calibration of all types of indicating instruments required, and preferably suitable technical qualifications.

Apply on forms AE6 available from the Establishments Officer, 53 Wake Green Road, Moseley, Birmingham 13, by September 26, 1953. (F 125)

BRITISH ELECTRICITY AUTHORITY

South East Scotland Division

GENERAL ASSISTANT ENGINEER (Civil) required. Candidate must have had sound general and technical education with qualifications leading to membership of appropriate engineering institution.

Salary within scale £501 to £656 (N.J.B. Class "AX/BX/8"), according to experience and qualifications.

Application forms obtainable from Divisional Controller, British Electricity House, Portobello, Midlothian, to be returned by September 26, 1953. (F 128)

BRITISH ELECTRICITY AUTHORITY

North Western Division

VACANCY No. 202/53 DRAUGHTSMAN (MECHANICAL) and DRAUGHTSMEN (ELECTRICAL) required at Generation (Construction) Department Drawing Office, Agecroft, near Manchester. Applicants should have had experience of (a) the layout of generating stations or general mechanical engineering, or (b) cable layouts and electrical diagrams. Salary dependent on qualifications and experience in range £433 to £767 or £567 to £671 (N.J.B. Schedule "D6" or "D5").

Vacancy No. 199/53. ASSISTANT SHIFT CHARGE ENGINEER, Agecroft (H.P.) Generating Station, near Manchester. Salary £641 to £687 (N.J.B. "G9").

Vacancy No. 200/53. ASSISTANT SHIFT CHARGE ENGINEER, Westwood Generating Station, near Wigan. Salary £641 to £687 (N.J.B. "G9").

Vacancy No. 203/53. SHIFT CHARGE ENGINEER, Chadderton (L.P.) Generating Station. Salary £649 to £681 (N.J.B. "E7").

Vacancy No. 204/53. SHIFT CHARGE ENGINEER, Kendal Generating Station. Salary £493 to £537 (N.J.B. "A7").

Vacancy No. 205/53. ASSISTANT MAINTENANCE ENGINEER (MECHANICAL), Stuart Street Generating Station, near Manchester. Salary £717 to £746 (N.J.B. "H8").

Vacancy No. 207/53. SHIFT CHARGE ENGINEER, Barrow Generating Station. Salary £633 to £643 (N.J.B. "D7").

Applications, quoting vacancy number, to Establishments Officer, British Electricity House, 825 Wilmslow Road, East Didsbury, Manchester 20, not later than September 19. (F 129)

YORKSHIRE ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:—

No. 1 (Bradford) Sub-Area

THIRD ASSISTANT ENGINEER
(Meters, Testing and Protection)

Candidates should hold at least Graduate Membership of the Institution of Electrical Engineers or equivalent technical qualifications.

They should have good experience in the commissioning of new equipment in large substations and in routine testing and maintenance of protective gear. Ability to calculate fault levels, grade protection and undertake cable and fault location, and experience in these matters, is desirable. The post may involve a measure of standby availability.

Salary, N.J.B. Class "K," Grade 10, £719 to £750 per annum.

GENERAL ASSISTANT ENGINEER
(Meters, Testing and Protection)

Candidates should hold the Higher National Certificate or an equivalent technical qualification.

They should have some experience in the commissioning of new substations and in routine testing and maintenance of protective gear.

This post may involve a measure of standby availability.

Salary, N.J.B. Class "K," Grade 13, £563 to £595 per annum.

Applications, giving full details of age, qualifications and experience, should be forwarded to the Manager, No. 1 (Bradford) Sub-Area, Yorkshire Electricity Board, 45 53 Sunbridge Road, Bradford, not later than September 24, 1953. (F 118)

BRITISH ELECTRICITY AUTHORITY

Yorkshire Division

APPLICATIONS are invited for the following appointments:—

BOILER HOUSE SUPERINTENDENT
FERRYBRIDGE POWER STATION
nr Knottingley

Salary £833 to £906 per annum, Class "H," Grade 6, N.J.B. agreement.

Applicants should have had a sound technical training and experience in the operation of a large power station, and preference will be given to candidates who are Corporate Members of the Institution of Mechanical Engineers, or who hold equivalent qualifications.

MAINTENANCE ENGINEER (ELECTRICAL)
THORNHILL POWER STATION
nr. Dewsbury

Salary £787 to £818 per annum, Class "G," Grade 6, N.J.B. agreement.

Applicants should have had a wide experience of power station electrical equipment and practical experience of E.H.T. switchgear and protective gear. Preference will be given to candidates who are Corporate Members of the Institution of Electrical Engineers, or who hold equivalent qualifications.

Application forms obtainable from Divisional Secretary (Establishments), British Electricity House, St. Mary's Road, Leeds 7, to be returned within 14 days of the appearance of this advertisement.

G. A. VOWLES,
Divisional Controller.
(F 97)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

APPLICATIONS are invited for the following positions within the Division.

CIVIL ENGINEERING DRAUGHTSMEN
Construction Department. Vacancy No. 22/53.

Candidates should have experience in design and detail of reinforced concrete structures, piled and slab foundations for heavy plant, culverts, cable subways, etc., for general building construction drainage and sanitation schemes, associated with office and administrative buildings.

The salary will be in accordance with Grade 5 (£567 to £671 per annum) or Grade 6 (£433 to £567 per annum) of Schedule "D" of the National Joint Board Agreement.

ENGINEERING DRAUGHTSMEN (MECHANICAL)
Construction Department. Vacancy No. 44/53.

Senior Draughtsmen are required in the Mechanical Section of the Construction Department at North Wilford Power Station. Candidates should have experience in one or more of the following:

1. Design and layout of power station equipment, including turbo-alternators, boiler plant, coal and ash plant and general station auxiliaries.
2. H.p. and l.p. steam and feed pipework. Condensing plant and feed heating systems.
3. Conveyor plant, coal handling systems and material handling of station auxiliary equipment.

Salary and conditions of service will be in accordance with the National Joint Board Agreement Grade 5 (£567 to £671 per annum) and Grade 6 (£433 to £567 per annum) of Schedule "D" according to experience.

ENGINEERING DRAUGHTSMEN (ELECTRICAL)
Vacancy No. 61/53.

Candidates should have experience in the preparation of layouts and diagrams for the installation of e.h.t. and l.t. switchgear, transformers, e.h.t. and l.t. cables, knowledge of protective gear systems would be an advantage.

The salary will be in accordance with Grade 5 (£567 to £671 per annum) or Grade 6 (£433 to £567 per annum) of Schedule "D" of the National Joint Board Agreement.

SHIFT CONTROL ENGINEER
Derby Power Station. Vacancy No 89/53.

Applicants should have had a sound training and practical experience in a modern generating station. The possession of a Higher National Certificate in Electrical Engineering, or its equivalent, would be advantageous.

The salary will be in accordance with Class "F," Grade 10 (£577 to £598 per annum) of Schedule "A" of the National Joint Board Agreement.

The closing date for this appointment will be September 14, 1953.

STATION SHIFT CONTROL ENGINEER
Avon Power Station. Vacancy No. 90/53.

Applicants should have had sound technical training and experience in the control of modern switchgear.

The salary will be in accordance with Class "E," Grade 10 (£555 to £569 per annum) of the National Joint Board Agreement.

The closing date for this appointment will be September 21, 1953.

SHIFT CHARGE ENGINEER
Hinckley Power Station. Vacancy No. 96/53.

Applicants should have had sound technical training and be fully experienced in the operation of steam power stations. The possession of an Ordinary National Certificate in Mechanical or Electrical Engineering or its equivalent will be an advantage.

The salary will be in accordance with Class "B", Grade 7 (£559 to £586 per annum) of the National Joint Board Agreement.

The closing date for this appointment will be September 24, 1953.

THIRD ASSISTANT ENGINEER
Technical Department, Divisional Headquarters.
Vacancy No. 97/53.

Preference will be given to applicants who hold a degree in electrical engineering. Candidates should have had experience in the commissioning and maintenance of switchgear and protective gear.

Experience of the analysis of tenders and of technical correspondence is desirable.

The salary will be within Schedule "C," Class "AX/DX," Grade 5 (£649 to £658 per annum) of the National Joint Board Agreement.

The closing date for this appointment will be September 24, 1953.

The above positions will be pensionable within the provisions of the British Electricity Authority and Area Boards Superannuation Scheme.

Applications should be submitted on the official form which may be obtained from the Divisional Establishments Officer, British Electricity Authority, Barker Gate, Nottingham, and should be returned to the undersigned by the dates stated. Please quote vacancy number.

L. F. JEFFREY,
Divisional Controller.
(F 131)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

DISTRICT COMMERCIAL OFFICER required in the Southport District of the Board's No. 1 Sub-Area. Salary £856 to £894 per annum (N.J.B. Grade 3, Class "E").

Applicants should be chartered electrical engineers and have experience in the preparation of technical schemes and estimates, contracting, sale of appliances, supervision of service centres and dealing with consumers' inquiries.

The appointment is superannuable and subject to medical examination.

Application forms obtainable from the Manager, No. 1 Sub-Area, Merseyside and North Wales Electricity Board, 24 Hatton Garden, Liverpool 3.

Closing date September 21, 1953. (F 108)

BRITISH ELECTRICITY AUTHORITY

COMBUSTION, Sub-Branch, Headquarters, London, require a SCIENTIST with a university degree and Corporate Membership of the R.I.C. or the I.C.E. to work on boiler combustion problems as junior assistant to the Scientific Adviser. Experience of power station practice will be an advantage, but is not essential. The successful candidate will acquire experience of power station boiler practice, particularly with relation to the coals burned, and also the microscopy of external boiler deposits. Salary N.J.B. Grade 5, £558 to £789 inclusive.

Forms from D. Moffat, Director of Establishments, Winsley Street, London W.1, to be returned by October 3, 1953. Quote reference ET/418. (F 114)

AMBITIOUS ENGINEERS who wish to make a progressive career in the development of modern domestic appliances are required by The English Electric Co., Ltd., Liverpool. Essential qualifications are three years experience of the manufacture and detailed design of cookers, washing machines, food mixers and other automatically controlled motor driven domestic appliances. Arrangements will be made to house the successful candidates.—Applications quoting reference 452 F to Dept. C.P.S., 336-7 Strand, London W.C.2. (F 144)

A METER DEVELOPMENT ENGINEER required by the English Electric Co. Applicants should have attained H.N.C. or degree standard and have some experience of design or manufacture of electricity meters and/or ancillary devices. Preference will be given to men with original ideas who can translate them into effective practical devices. The successful applicant will be located at the company's modern meter factory in Stafford. Salary up to £800 dependent on experience. —Write giving details to Dept. C.P.S., 336-7 Strand, London W.C.2, and quoting reference 1173. (F 145)

APPLICATIONS are invited for the posts of OVERHEAD LINESMEN to be located in the Staythorpe and Drakelow areas. Experience of 132 kV steel tower lines essential. Conditions and wages in accordance with N.J.I.C. Schedule.—Applications, stating age, experience, etc., should be submitted through the Ministry of Labour to Divisional Establishments Officer, British Electricity Authority, Barker Gate, Nottingham. Please quote Vacancy No. 94/53. (F 132)

ASSISTANT MECHANICAL MAINTENANCE ENGINEER required for organisation in East London district operating large electrical station. Applicants should have wide and up-to-date experience in the maintenance of modern generating station power plant and be capable of supervising turbine and boiler overhauls. Technical qualifications should be sound. Age not less than 32 or over 45. Commencing salary approximately £950 per annum with non-contributory pension. Position has excellent prospects.—Reply to Box No. 2889, Electrical Times, quoting reference TME/7. (F 52)

B.B.C. requires two DRAUGHTSMEN for Planning and Installation Dept. in Central London, to prepare and alter drawings of wiring and equipment installations. Some training engineering drawing and tracing with elementary knowledge electrical installations and symbols required. Starting salary £7 16s. p.w. rising by annual increments to £9 max. Promotion prospects.—Apply to E.E.O., BBC, London W.1, within seven days. (F 100)

ONTARIO, CANADA

A LARGE COMPANY has vacancies for ELECTRICAL and MECHANICAL DRAUGHTSMEN in their heavy duty transformers and transmission equipment plant in Ontario and invite application from men desirous of emigrating to Ontario who have university degree or National Standard certificate. The Company will advance 50% of transportation costs if desired.—Write or call for application Form, Dept. 2, Ontario Immigration Dept., 12, New Burlington Street, London W.1. (F 134p)

CAMEROONS DEVELOPMENT CORPORATION require for service in British Cameroons, West Africa, an ELECTRICAL SUPERVISOR. Candidates should have served an indentured apprenticeship in the electrical trade, and have had general electrical experience of installing, operating, and maintaining power plants as well as local distribution, street lighting and house wiring. A knowledge of line and radio telephones is desirable. Candidates should also have attained foreman status. Age limits 25-35, although an older man might be considered for the appointment. Commencing salary according to ability and experience in scale £775 to £1,175. Tours 18 to 24 months with generous leave on full pay. Outfit allowance £80. Provident fund contribution, 10 per cent employee, 15 per cent Corporation. First-class passages are provided together with free quarters equipped with heavy furniture.

Applications, in writing, giving full particulars to Rubber and Mining Agencies, Ltd., 52 Leadenhall Street, London E.C.3, to be received not later than September 25, 1953. Only applications from candidates selected for further consideration will be acknowledged. This post is exempt from the requirements of the Notification of Vacancies Order, 1952. (F 111)

CHIEF ENGINEER required by firm of switchgear manufacturers in North London, to take charge of design and development of l.t. switchgear. Must have held similar position and have had considerable experience on the development of air and oil circuit-breakers, fuse-gear and l.t. distribution systems.—Applications, giving full particulars, including salary required, to Box No. 2855, Electrical Times. (F 29)

CONTROL GEAR DESIGNERS required for manufacturers in South Midlands. Applicants should have knowledge of motor and machine characteristics and some control gear experience. Salary depending upon qualifications. Staff pension scheme in operation.—Reply, giving full details of training and experience, to Chief Engineer, Igranic Electric Co., Ltd., Bedford. (F 135)

DESIGNER with experience of engineering drawing required by company manufacturing domestic electrical appliances in the north-west. Must be capable of taking control of drawing office and experimental shop. Knowledge of press tools and welded construction suitable for vitreous enamelling essential. Position calls for initiative and drive with a flair for new ideas. Good prospects for the right man.—Write in confidence stating age, training, experience and salary required, Box No. 2893, Electrical Times. (F 112)

DRAUGHTSMAN required, experience in paper mill work and chemical plant layout an advantage, but not essential. Permanent position. Pension scheme. State experience and salary required.—Apply Labour Officer, Star Paper Mills, Ltd., Feniscowles, near Blackburn. Tel.: Pleasington 191. (F 55)

DRAUGHTSMAN required, senior, electrical, with experience of small electric motors and switchgear. Knowledge of railway rolling stock an advantage.—Applications, with details and salary required, to Personnel Manager, J. Stone and Co. (Deptford), Ltd., Arklow Road, New Cross, S.E.14. (F 136)

ELECTRICAL and radio wholesalers have vacancies in N. and E. London for experienced live REPRESENTATIVES to take over connections on generous terms.—Box No. 2897, Electrical Times. (F 137)

ELECTRICAL ENGINEERING DRAUGHTSMAN required for Site Drawing Office in Kuwait, Persian Gulf. Applicants, not over 35 years of age, should have had power station and sub-station design experience and should be in possession of Ordinary National Certificate. The starting salary will be £875 per annum, plus a cost-of-living allowance. Married accommodation cannot be promised under 12 months.—Applications in writing, giving full details of experience should be addressed to The Secretary, Ewbank and Partners, Ltd., Engineering Consultants, 10-11 Grosvenor Place, London S.W.1. (F 56)

ELECTRICAL ENGINEER (Measurements) with experience in electrical instrument standardisation and maintenance required by Research Laboratories, Herts.—Application, in writing, stating age, experience and salary required to Box No. 2895, Electrical Times. (F 119)

ELECTRICAL ENGINEER, not over 38, with sound scientific and engineering qualifications, required for Yorkshire factory manufacturing specialised electrical products. Salary based on qualifications and experience. The post offers good prospects for the right person, who must be available to commence on January 1, 1954.—Applicants should write, giving full details of age, education, training and experience, to Box No. 2857, Electrical Times. (F 30)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2

JOHNSON & PHILLIPS, LIMITED

APPLICATIONS are invited from Electrical Engineers for senior positions in the Company's India and Pakistan organisations.

The Company has long established organisations in the territories for the sale of the Company's products which include cables, transformers, switchgear, capacitors and domestic electrical equipment. The Company also maintains Contract Departments for complete industrial and other electrification schemes and the installation of the Company's products. In addition, the Company has a factory in Pakistan for the manufacture of switchgear and, in collaboration with an associated company, a similar factory in India.

Candidates must have had considerable technical and commercial experience in some or all of the foregoing activities such as to enable them to take executive positions leading possibly to management.

Candidates should preferably be not more than forty years old.

Applications (which will be treated in strict confidence) should be as complete as possible and should be addressed to:—

The Managing Director,
Johnson & Phillips, Ltd., Charlton, London S.E.7.
(F 110p)

ELECTRICAL ENGINEER required by Messrs. Norman and Dawbarn, Architects and Consulting Engineers, 5 Gower Street, London W.C.1. Graduate, or corporate member, of the Institution of Electrical Engineers with experience of industrial and domestic types of installation preferred. The work will involve the preparation of drawings, specifications and contract documents with some supervision of contract works.—Write, stating age, qualifications, experience and salary required. (F 143)

ELECTRICAL ENGINEER required for work in connection with oil pumping and pipeline installations. Applicants should have experience in design and specification of diesel generating equipment, large h.t. pumping units, high and low tension distributing systems and flameproof equipment. Successful applicant may be required to serve in India on Resident Engineer's staff during erection period of 12 to 18 months. Age about 30 years, qualifications A.M.I.E.E. or equal.—Application form may be obtained by sending postcard to Sir Bruce White, Wolfe Barry and Partners, 1 Lygon Place, Grosvenor Gardens, London S.W.1. (F 120)

ESTIMATING (SALES) CLERK (male), age 21-30, required. Good standard in maths and general education essential. Progressive, superannuation, sports. Permanency for right man.—Apply, Personnel Officer, Southern United Telephone Cables, Ltd., Dagenham Dock, Essex. (F 81)

FITTERS (ELECTRICAL) required at Drakelow Transmission Section. Applicants should have had experience in maintenance of 132 kV switchgear and transformers. Wages and conditions of service according to N.J.I.C. Agreement.—Applications, stating age, experience, etc., should be submitted through Ministry of Labour to Divisional Establishments Officer, British Electricity Authority, Barker Gate, Nottingham. Please quote Vacancy No. 95/53. (F 133)

IMPERIAL CHEMICAL INDUSTRIES, LTD., General Chemicals Division, invite applications for the position of SHIFT CHARGE ENGINEER in the Company's Power Department for duty in the first place in their West Bank Power Station, Widnes, which has an installed capacity of 40 MW in mixed high and low pressure plant.

Applicants, who should not be more than 35 years old, should have had a sound practical training in mechanical engineering, hold a Higher National Certificate in mechanical engineering or equivalent qualification, and should have had experience of the operation of modern high pressure water tube boilers, turbo-alternators and ancillary plant.

The commencing salary will not be less than that payable under the N.J.B. Schedule A for Class "G," Grade 7, while the maximum salary which a good man may expect to reach is considerably higher than that for the same class and grade.

The selected candidate will be required to pass a medical examination and to join the Company's Pension Fund.—Applications in writing, giving age and full particulars of education, technical qualifications, engineering training and power station experience, should be sent to the Staff Manager, Imperial Chemical Industries, Ltd., General Chemicals Division, Cunard Building, Liverpool 3, quoting reference P/6. (F 63)

JOINTER, for the Middle East, experienced in jointing cables up to 11 kV.—Apply, stating age and experience, with copies of testimonials, to Box No. 2865, Electrical Times. (F 86)

Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.

JOHNSON AND PHILLIPS invite applications for the appointment of CHIEF RUBBER TECHNOLOGIST, to fill a vacancy which will shortly be created by retirement.

Applicants should hold scientific qualifications of University Degree or comparable standard, and must possess extensive experience in senior capacity of the design and manufacture of rubber and thermoplastic cables with intimate knowledge of materials and compounds. They will be expected to be thoroughly familiar with the principal British and foreign cable specifications.

The duties involve overall responsibility to the Cable Test and Research Manager for all routine technical work relating to rubber cables and materials and for research and development. They cover laboratory activities, supervision of factory processes and assessment of cable design and performance. Particular importance is attached to competence in dealing with customers' inquiries and other technical problems relating to installation and operating conditions for rubber cables of all types.

Applications, giving full particulars of age, education, training experience and salary required, should be sent to Employment and Welfare Manager, Victoria Way, Charlton, S.E.7, marked Rubber Technologist and will be treated with the utmost confidence. (F 85)

REPRESENTATIVES of outstanding ability required for London and Home Counties by a leading electrical engineering company. Applications will only be considered from experienced men with a connection in the lamp and electrical industry.—Write, with full details of age, experience, qualifications and salary required, to Box No. 7021, c/o Charles Barker and Sons, Ltd., 31 Budge Row, London E.C.4. (F 121)

TRANSFORMER DRAUGHTSMEN required with some experience on units in the range 500 to 10,000 kVA. Salary according to qualifications.—Apply Technical Director, Bryce Electric Construction Co., Ltd., Kelvin Works, Hackbridge, Surrey. (F 138)

YOUNG ENGINEERS who have a knowledge of Power & Transformers and H.N.C. electrical are invited to apply for sales and contracts positions with English Electric at Stafford. Training may be given to suitable candidates.—Write quoting ref 396H to Dept. C.P.S., 336/7 Strand, London W.C.2. (F 101)

11 kV PLUMBER CABLE JOINTER required for contract work in this country. Headquarters will be South Wales. Permanent employment for first-class man.—Box No. 2899, Electrical Times. (F 139)

APPOINTMENTS WANTED

ELECTRICAL ENGINEER, M.Sc., A.M.I.E.E., experienced in noise and vibration measurements on electrical plant, and associated acoustic problems, seeks change.—Box No. 2847, Electrical Times. (F 26)

ELECTRICAL ENGINEER requires position with progressive contractor as Manager/Engineer, estimating, supervision, inquiries followed through to invoicing, control of staff.—Box No. 2859, Electrical Times. (F 32)

M. I.O.A., M.I.M. EXECUTIVE, age 39 years, with wide buying production, personnel and administrative experience, seeks change of appointment, preferably as manager. Power transformer and electrical engineering background. Present salary £750 per annum; present company 15 years.—Box No. 2891, Electrical Times. (F 96)

WORK WANTED

A. C. and d.c. MOTOR REWINDS and REPAIRS. Prompt service fully guaranteed. Edgware 5566 (4 lines).—Service Electric Co., Ltd. Stanmore, Middx. (F 13)

ARMATURE REWINDING service to the trade. Vacuums, Drills, Grinders, Hood Dryers, Dental Motors, Vacuum cleaner and drill armatures replaced from stock. 24-hour service. Every job guaranteed. All vacuum cleaner parts, hoses, etc., in stock for any make. Apex washer agitator shafts stocked.—Regam Electric Cleaner Service, 95 Park Lane, Leeds 1. (F 22)

FISHER FOUNDRIES LTD., Greet, Birmingham, have immediate capacity for machine moulded PRECISION CASTINGS in gunmetal and grey iron, ¼ to 30 lb. All castings shot blasted.—Telephone: Birmingham, Victoria 0197. (F 16)

WORK WANTED. Capacity available for all types of COIL WINDING.—Box No. 2425, Electrical Times. (F 17)

WANTED

A. C.-D.C. MOTORS, STARTERS, complete change-over installations, etc.—A.A. Electrical Co., Ltd., 67 Rothschild Road, Chiswick Park, W.4. Tel.: Chiswick 5106. (F 5)

TOWER WAGON. Tower Wagon required for the installation of lighting equipment inside factory.—Price and details to Derby Aviation, Ltd., Derby Airport, Burnaston, Derby. (F 88)

WANTED, D.C. and A.C. ball-bearing MOTORS, MOTOR GENERATOR SETS, DYNAMOS and ALTERNATORS.—Full details to Britannia Manufacturing Co., Ltd., 22-26 Britannia Walk, London N.1. (F 4)

WANTED, for prompt cash, ferrous and non-ferrous SCRAP; also plant for dismantling. Buyers of secondhand machinery and plant for re-use.—W. and H. Cooper, Ltd., 176 Brady Street, Bethnal Green, E.1. (F 1)

WANTED, Large quantity of 4-in. outside diameter TUBES from the dismantling of old Babcock water-tube boilers. Best prices paid. Prepared to purchase Babcock and Wilcox water-tube boilers for dismantling.—Apply, giving full details, to Midland Iron and Hardware Co., Cradley Heath, Staffs. (F 2)

WANTED, ROTARY CONVERTERS, any size.—Universal, 221 City Road, London E.C.1. (F 6)

WANTED, Second-hand STAGE LIGHTING EQUIPMENT in good condition.—Write particulars to Edward Wright and Son, 43 Castle Street, Dover. (F 89)

AGENCIES

M.A.A.—THE BADGE OF A GOOD MANUFACTURERS' AGENT. Manufacturers requiring reputable Agents are invited to communicate with the Secretary, The Manufacturers' Agents Association of Great Britain and Ireland (Inc.) Rosebery House, 8 Breams Buildings, London E.C.4. Membership available to established agents only. Particulars supplied. (F 19)

FOR SALE

GENERATING PLANT

FOR SALE, ALTERNATOR, 30 kVA, 400 V. 3-phase, 50 c/s, 4-wire, 1,500 r.p.m. Complete with exciter and control gear. Very little used (new 1947).—Peter, Bogengarrie, Mintlaw. Tel. 285. (F 91)

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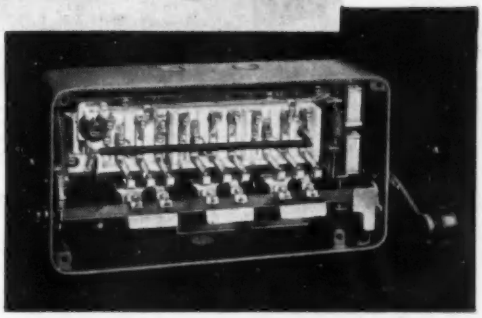

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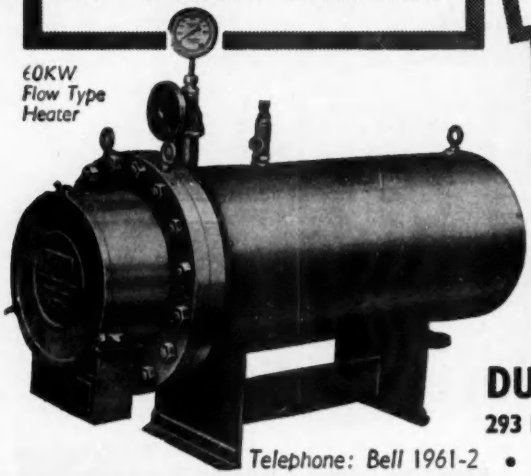

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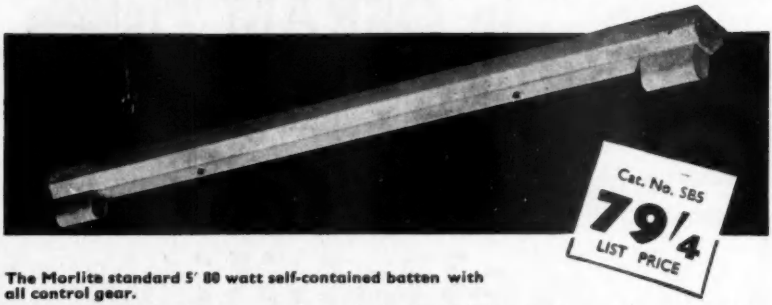

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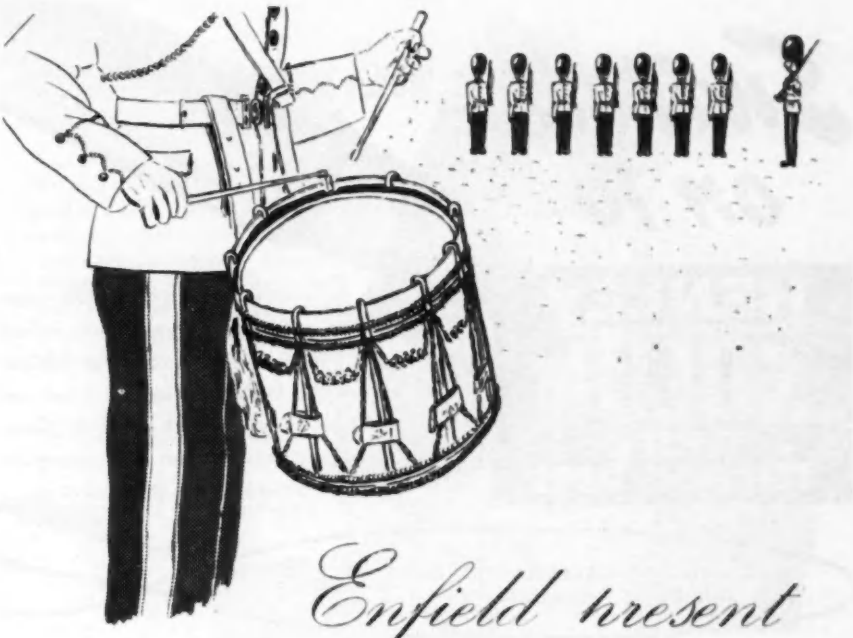

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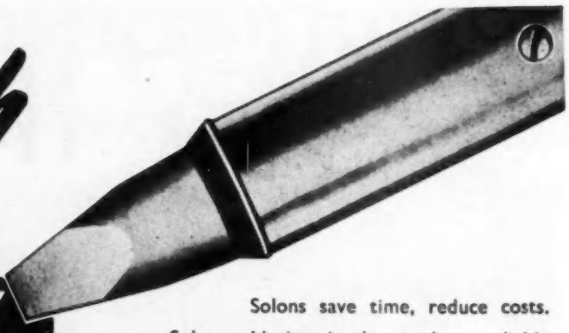

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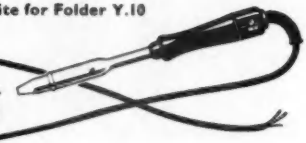

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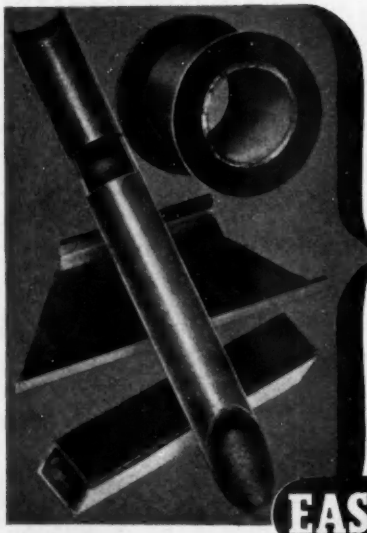

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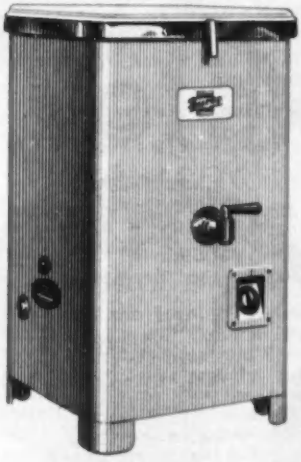

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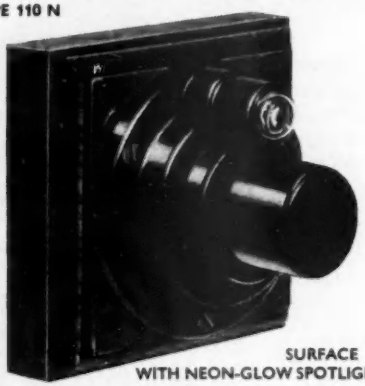

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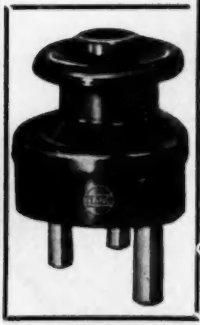

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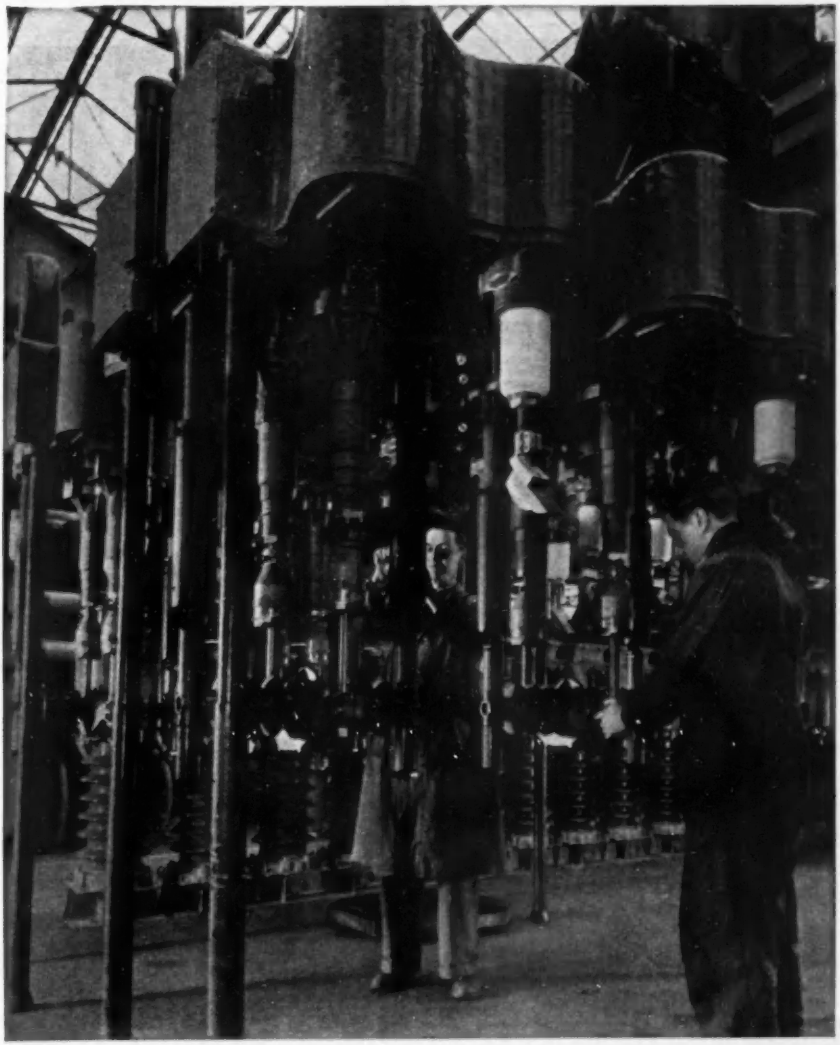

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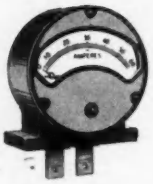

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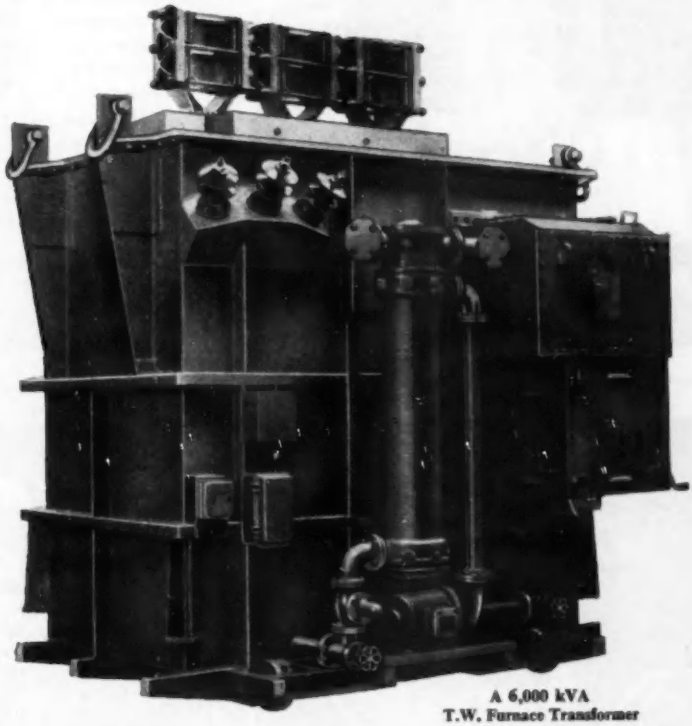

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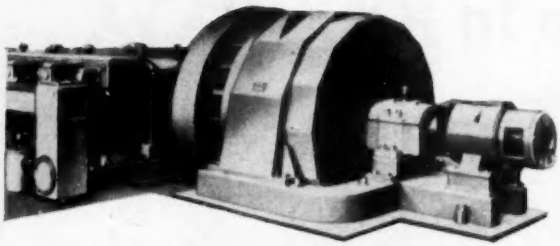

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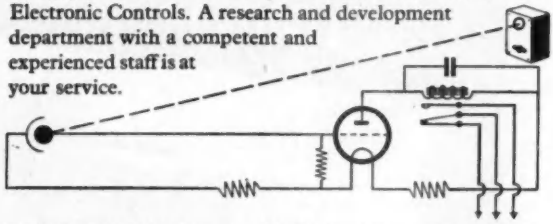

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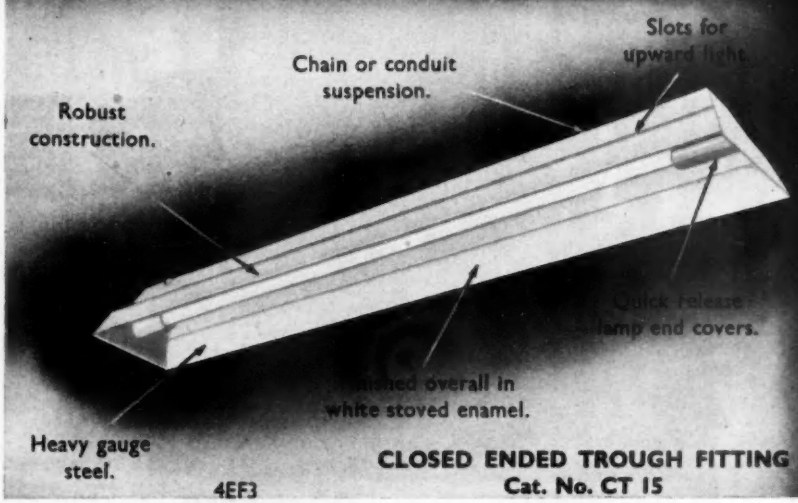
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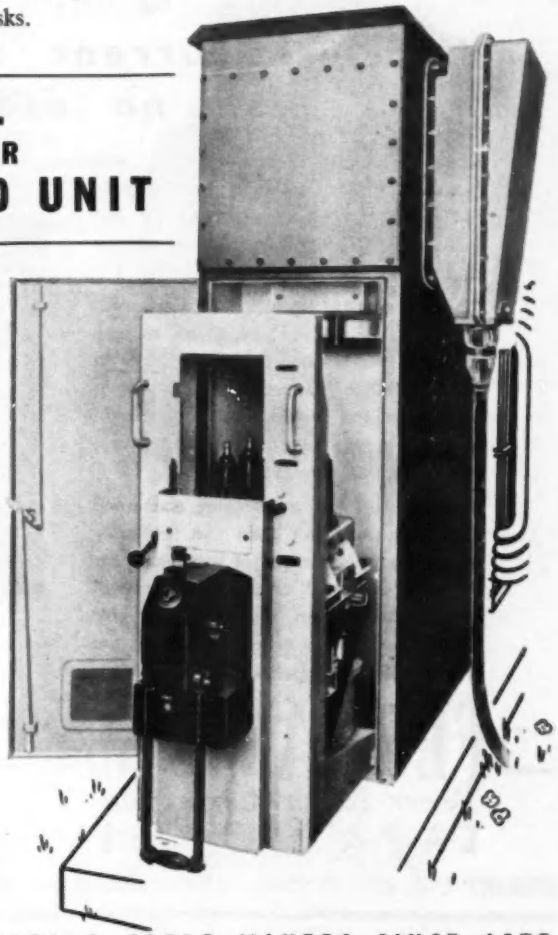

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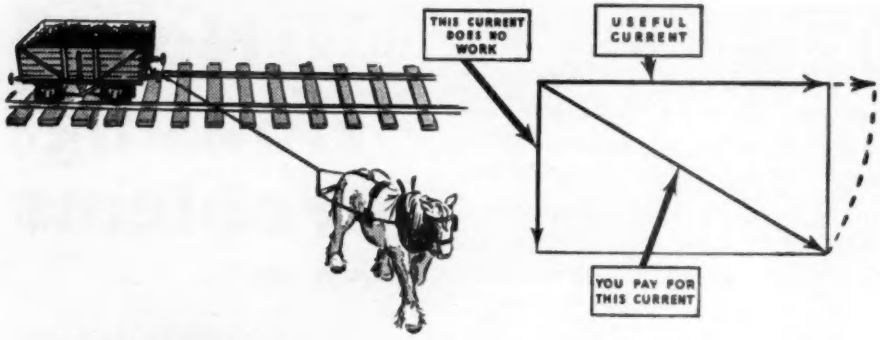

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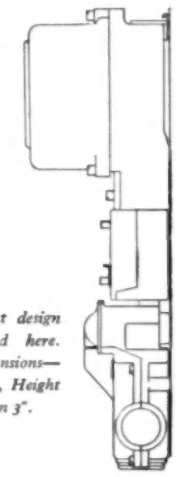

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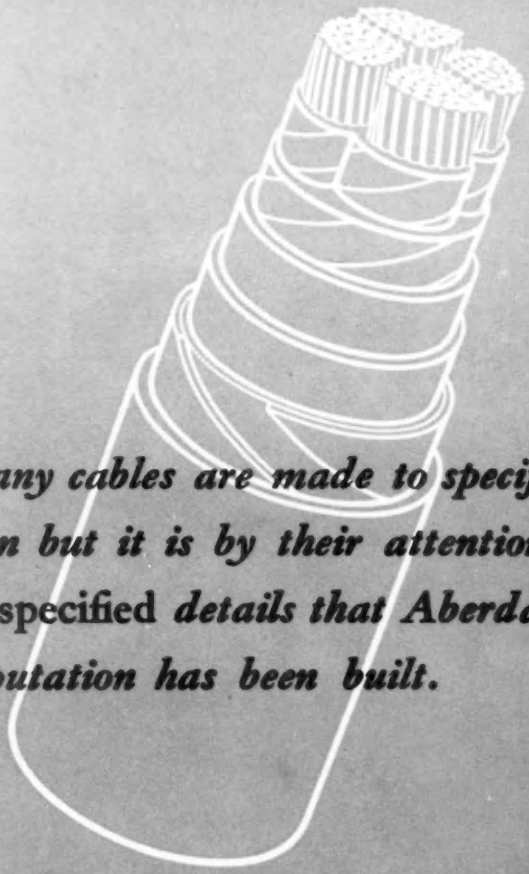

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